# Emerging Trends in Construction Law

# at the Confluence of Academia and Industry

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**A thesis submitted in partial fulfilment of the requirements of the University of Wolverhampton for the degree of Doctor of Philosophy by Published Work**

**July 2021**

This work or any part thereof has not previously been presented in any form to the University or to any other body whether for the purposes of assessment, publication or for any other purpose (unless otherwise indicated). Save for any express acknowledgments, references and/or bibliographies cited in the work, I confirm that the intellectual content of the work is the result of my own efforts and of no other person.



**Signature**……

**Date**……

**ABSTRACT**

Engineering UK's 2018 report on the state of engineering records that in 2016, engineering enterprises generated 23.2% of the UK's total turnover of £5.3 trillion (£1.23 trillion) and construction had a turnover of £171.91 billion, representing 14.0% of the total turnover produced within the engineering sectorial footprint. The congruence and distinction between the law underpinning construction and engineering in academia and industry is uncertain. The research aim therefore is construction and engineering law compared and contrasted from academia to industry.

The author adopted a constructionist or subjective epistemology and relativist ontological stance. Constructivist and pragmatic philosophical paradigms and qualitative methodologies were selected including document analysis, interviews, case studies and focus groups.

The construction and engineering law required by professional institutions to be taught in academia to undergraduates were analysed. Some similarity between the legal topics mandated by engineering and construction professional institutions was identified; for example, the legal framework, contract, environmental and health and safety law. The differences are that engineering bodies also require intellectual property awareness and construction institutions incorporate dispute resolution and land law. It was also argued that the importance of European Law should be recognised.

Guidance for construction expert witnesses, who are engaged in dispute resolution, arising from three relevant significant documents that were published in 2014 by the Civil Justice Council, the Royal Institution of Chartered Surveyors and the Society of Construction Law was researched. The following were suggested as barriers affecting experts: regulations, budgetary controls, availability of evidence and deadlines.

Construction-specific legal risks relevant to SMEs in Europe with a view to manage them were identified. The study confirms that the relevant legal risks for construction SMEs in Italy are: procurement, building regulations, construction contract and dispute resolution. The civil engineering SME case study touched on contract terms, regulations and dispute resolution and the additional issue of intellectual property protection was recognised.

Environmental law issues surrounding the regeneration of brownfield land including contaminated land, waste management, water pollution, regulators, environmental impact assessment issues were investigated. Contractors' standard of design responsibility in current standard forms of contract was analysed and recent relevant case law was reviewed.

In conclusion, the overlap in academia, between construction and engineering law of legal topics including legal framework, contract, environmental and health and safety law has been identified. They differ in that engineering bodies additionally require intellectual property awareness and construction institutions include dispute resolution and land law. These findings in academia are reflected in industry.

Although framed in a construction law context, the research on expert witnesses also applies to engineering expert witnesses. However, as identified by the accrediting professional bodies, there is a greater requirement for dispute resolution in the construction industry.

Environmental law is relevant to both engineering and construction industries. Similarly, current standard forms of contract and recent case law are pertinent to both industries.

The congruence and distinction between the law underpinning construction and engineering in academia and industry has been clarified.

Subsequent research developed a design, manufacture and construct procurement model for volumetric offsite manufacturing in the UK housing sector and examined the introduction of Brownfield Land Registers in England. Topical and timely research examined the impact of BREXIT and the COVID-19 pandemic on construction law.

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**ACKNOWLEDGEMENTS**

I would like to express my sincere appreciation of my colleague, Dr Ezekiel Chinyio who, as my academic advisor, supported and guided me in finalising my PhD Commentary. I am also grateful for the encouragement and support from Professor Mohammed Arif, Head of the School of Architecture and the Built Environment and Dr Andrew Agapiou of the University of Strathclyde.

Thank you to my husband, Dr Mike Charlson, and our daughter Elanor for balancing my academic life with a contrasting home one. The debate about who is the real Doctor myself (PhD) or my husband (Medical Practitioner) continues.

In memory of my late parents (Mike and Karen Inskeep) and late aunt (Adi Inskeep) who all became terminally ill and then sadly died while I was on this journey. Managing their care and then their estates as executor put my academic endeavours into perspective.

**PUBLICATIONS by Jennifer Charlson**

**Journal papers**

- Charlson, J. and Dimka, N. (2021) "Design, manufacture and construct procurement model for volumetric offsite manufacturing in the UK housing sector", *Construction Innovation* Ahead of print https://doi.org/10.1108/CI-10-2019-0108

- Charlson, J. (2021) "The Introduction of Brownfield Land Registers in England", *Planning Practice & Research*, **36**(2) pp 216 – 229.

- Charlson, J. and Dickson, R. (2021) Covid-19 and Construction Law: Comparing the UK and Australian Response. *The International Construction Law Review*, **38**(1) pp 5-38.

- Charlson, J. (2021) Briefing: Brexit and UK construction law: past, present and future. *Proceedings of the Institution of Civil Engineers – Management, Procurement and Law*, **174**(1) pp 3-6.

- Charlson, J. (2021) Briefing: Beyond Brexit: trade and procurement implications for the UK construction industry. *Proceedings of the Institution of Civil Engineers – Management, Procurement and Law*, **174**(3) pp 95-98.

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- Charlson, J. (2018) Regeneration of Brownfield Land: the Environmental Law Challenges. *Journal of Property, Planning and Environmental Law*, **10** (3) pp 202-218.

- Charlson, J. and Oduoza, C. (2016) Construction industry legal risk identification for SMEs. *Construction Law Journal*, **32**(6) pp 630-643.

- Wall, R., Ankrah, N. and Charlson, J. (2016) An investigation into the different styles of the lawyer and construction specialist when mediating construction disputes. *International Journal of Law in the Built Environment*, **8**(2) pp 137–160.

- Charlson, J. and Smalley, J. (2015) Expert Witness Update for 2014. *Construction Law Journal*, **31**(4) pp 210–219.

- Hetherton, T. and Charlson, J. (2015) When Statutes Collide: Potential Recovery of Own Party Adjudication Costs. *International Journal of Law in the Built Environment*, **7**(3) pp 214–230.

- McKenna, L. and Charlson, J. (2015) The Contract (Rights of Third Parties) Act 1999 versus Collateral Warranties in the UK Construction Industry. *Construction Law Journal*, **31**(6) pp 320-337.

- Charlson, J. (2014) Law for engineering undergraduates on accredited courses. *Proceedings of the Institution of Civil Engineers – Management, Procurement and Law*, **167** (MP4) pp 201–206.

- Charlson, J., Baldwin, R. and Harrison, J. (2014) Early perceptions of allowing adjudication of oral contracts. *International Journal of Law in the Built Environment*, **6**(3) pp 233-249.

- Smalley, J. and Charlson, J. (2014) A Critical Review of the Effective Use of Expert Witnesses in Construction Disputes. *Construction Law Journal*, **30** (5) pp 268–285.

**Textbook**

- de Silva, C. and Charlson, J. (eds.) (2021) *Galbraith's Construction and Land Management Law for Students.* 7th ed. Abingdon: Routledge

J Charlson is author of the following chapters:

- Chapter 2 - The United Kingdom and the European Union
- Chapter 3 - Dispute resolution
- Chapter 7 - Special contracts
- Chapter 8 - Construction contracts
- Chapter 16 - Building Regulations
- Chapter 17 - Environmental law

**Conference Papers**

- Charlson, J. and Oduoza, C. (2014) Legal risk identification for SMEs in the construction industry In: Raiden, A B and Aboagye-Nimo, E (Eds) *Procs 30th Annual ARCOM Conference*, 1-3 September 2014, Portsmouth, UK, Association of Researchers in Construction Management, pp 507-515.

- Charlson, J. and Chinyio, E. (2013) A case study of joint procurement and provision of legal services to a group of universities in the Midlands In Smith, S.D and Ahiaga-Dagbui, D.D. (Eds) *Procs 29th Annual ARCOM Conference*, 2-4 September 2013, Reading, UK, Association of Researchers in Construction Management, pp 493-502.

- Charlson, J. (2012) Online Pedagogy for Construction Law in UK Higher Education. *The Construction, Building and Real Estate Conference of the Royal Institution of the Chartered Surveyors*. Held at Las Vegas, Nevada, USA by Arizona State University 11-13 September 2012. London: Royal Institution of Chartered Surveyors.

# 1 Introduction

## 1.1 Commentary Structure

This commentary explores and evidences "*the crux of a successful PhD - originality, knowledge contribution, coherence and a reflective journey*" (Smith, 2015, p.84).

The contents of the ten chapters are outlined below:

1. Chapter One sets the research in the broader context of the law underpinning construction and engineering industries and considers relevant text books.
2. Chapter Two details the research justification, aim, objectives and PhD by Publication. The research aim of construction and engineering law compared and contrasted from academia to industry is introduced.
3. Chapter Three summarises the conference papers which were the foundations of the subsequent journal papers and identifies the relevant journals.
4. Chapter Four summarises the journal papers.
5. Chapter Five incorporates an expanded research methodology section and details the research methods deployed for each journal paper.
6. Chapter Six analyses the journal papers, their application to practice and subsequent developments.
7. Chapter Seven concludes with the contribution to knowledge for each paper and identifies future research.
8. Chapter Eight comprises reflections on the PhD by Publication journey, up to submission of my PhD thesis in February 2020, and evidences my development as a researcher.
9. Chapter Nine details my research from my PhD thesis submission in February 2020 to my June 2021 PhD viva.
10. Chapter Ten comprises my post PhD viva reflections in July 2021.

## 1.2 Construction and Engineering Law

This section details the contribution of construction and engineering to the UK economy and endeavours to define the scope of construction and engineering law.

Engineering UK's (2018) report on the state of engineering records (p.31) that *"in 2016, engineering enterprises generated 23.2% of the UK's total turnover of £5.3 trillion (£1.23 trillion)"*. Considering employment, the report identifies (p.170) *"Workers within the engineering sector – including engineering and non-engineering occupations – accounted for 18.9% of all employees in 2016."*

Engineering UK's (2018) report details (p.47) that *"construction had a turnover in 2016 of £171.91 billion, representing 14.0% of the total turnover produced within the engineering sectorial footprint."* Rhodes (2018, p.3) reports that *"In 2017, the construction sector contributed £113 billion to the UK economy, 6% of the total" and "There are 2.4 million construction industry jobs in the UK in Q3 2018, 6.8% off all jobs."*

Construction law can be aligned to a construction project life-cycle beginning with addressing regulatory compliance and finalising the project contracts then, contract administration and finally, dispute resolution may be required (Mason, 2016). Uff (2013, p. 1) asserts that *"The term "construction law" is now universally understood to cover the whole field of law which directly affects the construction industry and the legal instruments through which it operates."* He continues that construction contracts need to be efficient, workable and facilitate dispute resolution with procurement lying at the root of their reform. Quinn (2008) advises Project Managers, regarding construction and engineering law, that they need to understand contract law, tort and statute law; building contracts and consultants' appointments; health and safety regulations and dispute resolution.

The congruence and distinction between the law underpinning construction and engineering in academia and industry is uncertain. Construction and Engineering law is primarily taught and researched in Built Environment Schools and Engineering Faculties respectively at universities rather than in Law Schools. The situation is similar in the USA as explained by Campbell (2015, p.IV)"..*law schools have been late to consider construction law on its own terms. Ironically, this is not true for other professional schools – such as architecture and construction management – which have made construction law a core part of the curriculum*." The textbook "*Construction law: an introduction for engineers, architects, and contractors*" supports the discipline in the United States (Kelley, 2012).

The Legal Practice Course "LPC" (the final vocational stage for becoming a solicitor in England and Wales) is designed to provide a bridge between academic study and training in a law firm. The LPC benefits from specific texts on relevant topics for example, *"Business Law"* (Slorach and Ellis, 2018) and "*Property Law*" (Abbey and Richards, 2018). The boundaries of construction and engineering law are harder to define. There are LPC texts for neither construction nor engineering law.

A recommended book is "*Construction Law*" (Uff, 2013), in print for over 40 years, which covers the Legal System; Dispute Resolution; Parties; Business Organisations; Obligations; Contract; Insurance; Construction Contracts; Bonds; Standard Forms of Contract; Law of Tort; Land, Planning and Environmental law and Statutes and Safety.

"*Galbraith's Building and Land Management Law for Students*" (Galbraith et al., 2011), compared with Uff (2013), does not include Parties; Obligations; Bonds and Standard Forms of Contact and environmental law but incorporates Landlord and Tenant; Central and local government; Employment law and Highways. "*Law and the Built Environment*" (Wood et al., 2011) which "*provides an introduction to the key legal principles that underpin the professional and commercial lives of those who provide advice to clients in the property and construction sectors*", compared with Uff (2013), does not include Dispute Resolution; Parties; Obligations; Insurance; Construction Contracts and Bonds but adds The Law of Landlord and Tenant.

There are other books focusing on particular aspects of construction law for example, *"Contractual Procedures in the Construction Industry"* Ashworth and Perera (2018) which

examines contract law within the context of construction contracts and "*Construction Contracts: Law and Management"* Hughes et al. (2015) which provides comprehensive coverage of the legislation, administration and management of construction contracts and "*A Practical Guide to Construction Adjudication*" (Pickavance, 2016).

The respected academic tomes of "*Hudson's building and engineering contracts"* (Atkin Chambers, 2014) and "*Keating on Construction Contracts"* (Furst and Ramsey, 2016) further detail construction contract law.

A more recent compilation of construction law is "*Construction Law; from beginner to practitioner*" (Mason, 2016) which includes:

- The fundamentals of law and the English legal system
- Contract, business, tort and property law
- Procurement, subcontracting and partnering
- Building Information Modelling and best practice
- Dispute resolution including mediation, arbitration, litigation and adjudication

The scope of engineering law is even harder to establish as the only book (Haring, 2012) found titled "*Engineering Law*" was originally published prior to 1923. Although a more recent title, "*Law and the Engineer*" (Mayson, 1955), it is still over 60 years old. "*Engineering law and the I.C.E. contracts*" (Abrahamson, 1979) is more recent but is limited by its focus on civil engineering.

"*Construction and Engineering Law: A Guide for Project Managers*" (Marsden and Makepeace, 2008) covers: Liability in Contract and Negligence; Collateral Warranties; Appointments; Standard Forms of Contract; Legislation; Health and Safety; Professional Indemnity Insurance and Dispute Resolution.

These textbooks endeavour to define the scope of construction and engineering law but there are no definitive boundaries. For brevity, academic papers are not considered in this section.

The boundaries of construction and engineering law are uncertain. The research question therefore is *"What is the congruence and distinction between the law underpinning construction and engineering in academia and industry?"*

# 2 Aim, Objectives and PhD by Publication

## 2.1 Aim and Objectives

The aim of the research is to compare and contrast construction and engineering law from an academic to industry perspective. The research objectives are:

- Analysis of construction and engineering law required by professional institutions to be taught in academia to undergraduates;
- Guidance for expert witnesses who engage in dispute resolution;

- Identification of construction-specific legal risks relevant to SMEs in Europe with a view to manage them;
- Environmental law issues surrounding the regeneration of brownfield land; and
- Interpreting contractors' mandated standard of design.

The research justification of and problem for each area or topic is made within the relevant journal papers.

## 2.2 PhD by Publication

It can be argued that a PhD by publication is one means of delivering "*a central tenant of doctoral research … that the work achieved should have an impact on other knowledge in the field*." (Powell, 2004, p.7). Robins and Kanowski (2008) assert that there are firm pedagogical reasons for encouraging publication by doctoral students. Kamler (2008, p. 283) argues for more significant pedagogical consideration to writing for publication in higher education; "*When the results of research are not published, there are diminished opportunities for the kinds of professional dialogue and knowledge building that can take a field forward.*" Clarke and Lunt (2014) explain that the desirability of publishing may be tacitly understood, rather than overtly stated.

Clarke and Lunt (2014) report that for some examiners, publication appears to have become almost a surrogate for originality. Wilson (2002, p.76) explains *"It is probable that the majority of a candidate's published works will have been subject to peer review prior to their acceptance for publication and hence that the originality of them will already have been established by the reviewers."*

Professor Wilson is the author of two reports (1996; 1998) published by the UK Council for Graduate Education about published work for doctoral degrees. In his 1998 report, Professor Wilson argued *"It is easy to see that, assuming publications are in high quality, refereed journals or books, the inclusion of published work in a thesis strengthens the candidate's case for having made a contribution to knowledge, as well as the examiners' assessment that this aspect of doctorateness has been achieved."*(p.14)

In a paper subsequent to his reports, Professor Wilson (2002, p.73) advises regarding the number of publications required for the successful submission of a PhD by published work:

*"Initially, there was no simple advice which could be given to the numbers question ... With progressive feedback from assessors and examiners, numbers in excess of ten publications were subsequently positively discouraged. Some of the more recent successful submissions have been based on as few as three published works."*

Robins and Kanowski (2008, p.6) explain that *"Typically, three to five research articles are required to constitute a PhD thesis."*

Mullins and Kiley (2002, p.379) who interviewed over 30 experienced PhD examiners asked "what makes a passable thesis?" summarised the responses as including *"the PhD was of a sufficient standard that parts of it .. could be published."* Comments regarding doctoral

publications from the PhD examiners who acknowledged the influence of pre-publication, included *"Lightens the burden for the examiner as other reviewers have said that it is OK";* "*It immediately suggests that the student deserves the degree*" and *"If there are two or three good publications you can put your feet up and go for an interesting drive."* (Mullins and Kiley, 2002, p. 381).

# 3 Conference Papers and Journals

## 3.1 Conference Papers

Although not formally submitted for consideration, the following three peer-reviewed conference papers were presented and published in proceedings:

- **Charlson J.** (2012) Online Pedagogy for Construction Law in UK Higher Education. *The Construction, Building and Real Estate Conference of the Royal Institution of the Chartered Surveyors*. Held at Las Vegas, Nevada, USA by Arizona State University 11-13 September 2012. London: Royal Institution of Chartered Surveyors

- **Charlson J.** and Chinyio E. (2013) A case study of joint procurement and provision of legal services to a group of universities in the Midlands In: Smith, S D and Ahiaga-Dagbui, D D (Eds) *Procs 29th Annual ARCOM Conference,* 2-4 September 2013, Reading, UK, Association of Researchers in Construction Management, pp 493-502.

- **Charlson J.** and Oduoza C. (2014) Legal risk identification for SMEs in the construction industry In: Raiden, A B and Aboagye-Nimo, E (Eds) *Procs 30th Annual ARCOM Conference,* 1-3 September 2014, Portsmouth, UK, Association of Researchers in Construction Management, pp 507-515.

The background and content of each conference paper is described. This section is included in the commentary as important research skills were developed subsequently leading to the successful development and publication of journal papers. The opportunity to network with fellow academics was also enjoyed.

### 3.1.1 Online Pedagogy for Construction Law in UK Higher Education

The final module on the Postgraduate Certificate Academic Practice in Higher Education course "*The Academic as Researcher*" was attended by the author in 2012. The module allowed the student to negotiate an independent practice-based research project in an area of relevance to the student's academic practice. The assessment also included the preparation of a reflexive learning journal. The Royal Institution of Chartered Surveyors is one of the professional bodies accrediting the School of Architecture and the Built Environment's courses. Furthermore, its Construction, Building and Real Estate Conference (COBRA 2012) incorporated a Legal Research Symposium. It was therefore agreed that research leading to a conference paper targeted at COBRA 2012 would be developed.

The abstract for "*Online Pedagogy for Construction Law in UK Higher Education*" was accepted in the Legal Education in Property & Construction stream of the COBRA 2012

Legal Research Symposium. The topic was chosen because the author had been tasked by the Head of School with developing modules to be delivered online. The subsequent paper was accepted subject to specific revisions.

#### 3.1.2 A case study of joint procurement and provision of legal services to a group of universities in the Midlands

The researcher had been invited to contribute to the team jointly procuring the provision of legal services to a group of universities in the Midlands. The access to research data was identified and co-authorship with Dr Ezekiel Chinyio, who has a research interest in procurement, agreed. The Association of Researchers in Construction Management (ARCOM) Conference was selected. The paper was accepted and presented at the conference. The networking with peer researchers was valuable but obtaining approval of funding to attend despite the UK location was challenging.

#### 3.1.3 Legal risk identification for SMEs in the construction industry

A European Union (EU) funded project "*Risk Management Software System for SMEs in the Construction Industry (RiMaCon)*" led by Professor Chike Oduoza (Professor in Process and Manufacturing Engineering and Fellow of the Institution of Chemical Engineers) was identified. A proposal to analyse relevant legal risks with a view to manage them was accepted. The author was then appointed as a Senior Researcher on this project. A critical literature review was undertaken and the themes that emerged included procurement, building information modelling, building regulation and construction contract issues including delay, claims and dispute resolution. As this was a FP7 Marie Curie Industry-Academia Partnerships and Pathways Project, the author benefitted from two secondments to a construction SME in Padova, Italy. A case study of the construction SME was undertaken.

A call for law papers for the Legal Research Symposium at ARCOM 2014 Conference was received. As the research was relevant and EU funding available, a paper for this conference was developed. The abstract and paper with minor amendments were accepted.

In summary, the author developed valuable investigative and analytical skills by progressing and publishing conference papers leading to the research detailed in the next chapter.

## 3.2 Journals

Papers have been published in the following three peer reviewed journals:

- Journal of Property, Planning and Environmental Law
- Proceedings of the Institution of Civil Engineer – Management, Procurement and Law
- Construction Law Journal

These journals are discussed in the following sections.

#### 3.2.1 Journal of Property, Planning and Environmental Law

The Journal of Property, Planning and Environmental Law is published by Emerald Group Publishing and indexed by Scopus, Emerging Sources Citation, Lexis Nexis and Westlaw.

The journal is a CIB Encouraged Journal by the International Council for Research and Innovation in Building and Construction (CIB).

The journal provides a vehicle for the publication of high quality legal scholarship in the related areas of property law, planning law and environmental law. It publishes original legal research contributions for the benefit of scholars, policy makers and practitioners in these areas, including those operating in the fields of legal practice, housing and planning.

The Editor is Assoc. Prof. Julie Adshead of Manchester Metropolitan University.

#### 3.2.2 Proceedings of the Institution of Civil Engineers – Management, Procurement and Law

Proceedings of the Institution of Civil Engineers – Management, Procurement and Law (MPL) publishes papers on all aspects of the management, procurement and legal aspects of running construction projects.

The author is currently a member of the Editorial Advisory Board for this journal under the Editorship of Dr Simon Smith CEng FICE, Senior Lecturer in Construction & Project Management, School of Engineering, University of Edinburgh.

#### 3.2.3 Construction Law Journal

The Construction Law Journal (CLJ) is published by Sweet & Maxwell and is also available on Westlaw. It is tailored for the needs of lawyers, architects, engineers, surveyors and company officers who require a forum to which they can turn for guidance, comment and informed debate. The Journal asserts it will continue, as one of the leading publications in its field, to provide expert articles, case notes and commentary on all aspects of construction law. From 2007 it has been peer reviewed.

The General and Articles Editor is Andrew Burr MA ACIArb Adjudicator, Arbitrator and Barrister, Atkin Chambers. The Editorial Board includes His Honour Judge Anthony Thornton QC, Judge of the Technology & Construction Court.

## 4 Journal Papers

The peer-reviewed papers submitted for the PhD by Publication are:

1. **Charlson J**. (2014) Law for engineering undergraduates on accredited courses. *Proceedings of the Institution of Civil Engineers – Management, Procurement and Law*, **167**(MP4) pp 201–206.
2. **Charlson J.** and Smalley J. (2015) Expert Witness Update for 2014. *Construction Law Journal*, **31**(4) pp 210–219.
3. **Charlson J.** and Oduoza C. (2016) Construction industry legal risk identification for SMEs. *Construction Law Journal*, **32**(6) pp 630-643.
4. **Charlson J**. (2018) Regeneration of Brownfield Land: the Environmental Law Challenges. *Journal of Property, Planning and Environmental Law* **10** (3) pp 202-218.

5. **Charlson J**. (2019) Briefing: Interpreting contractors' mandated standard of design. *Proceedings of the Institution of Civil Engineers – Management, Procurement and Law*, **172** (4) pp 142-145.

The selected peer reviewed journal papers are detailed below.

## 4.1 Law for engineering undergraduates on accredited courses

The paper submitted is **Charlson J**. (2014) Law for engineering undergraduates on accredited courses. *Proceedings of the Institution of Civil Engineers – Management, Procurement and Law*, **167** (MP4) pp 201–206.

Engineering departments in UK universities may decide to deliver shared modules on their courses. Law is a contender for such common provision. However, professional institution accreditation for undergraduate degree programmes is significant.

A qualitative methodology using document analysis was chosen. Engineering professional institutions' accreditation documentation was scrutinised and the relevant law requirements were identified and summarised. The accreditation role of the Engineering Council and Joint Board of Moderators is described. Additionally, due to the intersection between civil engineering and construction, the Royal Institution of Chartered Surveyors and Chartered Institute of Building's requirements were analysed. This article then appraises the engineering and construction professional institutions' law requirements.

Some similarity between the legal topics mandated by engineering and construction professional institutions is identified; for example, the legal framework, contract, environmental and health and safety law. The differences are that engineering bodies also require intellectual property awareness and construction institutions incorporate dispute resolution and land law. An argument can be made that both professional bodies should acknowledge the significance of European law. An engineering and construction law lecturer's qualifications and experience are interrogated. Some of the requirements of the engineering and construction professional institutions are similar promoting the delivery of common law modules.

## 4.2 Expert Witness Update for 2014

The paper submitted is **Charlson J.** and Smalley J. (2015) Expert Witness Update for 2014. *Construction Law Journal*, **31** (4) pp 210–219.

After the success of their paper, *"A Critical Review of the Effective Use of Expert Witnesses in Construction Disputes"* the authors were keen to continue their research collaboration following James Smalley's graduation with a MSc in Construction Law. This type of academic-practitioner partnership is advocated by Fawcett and Pockett (2015). This initiative was sparked by publication of the Civil Justice Council's (CJC) *"Guidance for the Instruction of Experts in Civil Claims 2014.*

Three important reports relevant to construction expert witnesses, who engage in dispute resolution, were published in 2014: the Civil Justice Council's (CJC) *"Guidance for the*

*Instruction of Experts in Civil Claims 2014"* in August; the Royal Institution of Chartered Surveyor's (RICS) 4th edition of *"Surveyors Acting as Expert Witnesses"* effective from July and The Society of Construction Law's (SCL) *"Review of Use of Experts in Dispute Resolution"* in June. This paper records research on these documents.

A qualitative mixed methodology of document analysis followed by interviews was followed. The reports were analysed and topics identified were examined by interviews with experienced construction expert witnesses. The interviews revealed the following issues: contingency fees, budgeting, exchange of expert evidence, client understanding and expert witness liability. Regulations, budget controls, availability of evidence and deadlines for reports were suggested as barriers affecting experts. The experts' view was that fees, challenges from experts overseas, a requirement for a more diverse CV and cross examination experience were challenges they will face within the next five years.

The author reviewed the reports, we developed the interview questions together and James undertook the interviews. The author then led on the analysis, drafting the article for submission and responding to the reviewer's feedback. The paper was reviewed by the General and Articles Editor and accepted subject to minor amendments.

## 4.3 Construction industry legal risk identification for SMEs

The paper submitted is **Charlson J.** and Oduoza C. (2016) Construction industry legal risk identification for SMEs. *Construction Law Journal*, **32** (6) pp 630-643.

This research contributes to an EU-funded Marie Curie Industry-Academia Partnerships and Pathways Project: *"Risk Management Software System for SMEs in the Construction Industry (RiMaCon)".* The project aims to develop, test and validate a cost-effective and user-friendly risk management system for SMEs in the construction sector.

As the corresponding/main author, the first author contributed most of the content of the paper including analysing and collecting the primary data. Professor Oduoza was particularly helpful in clearly defining the aim and objectives and also proofread the paper with recommendations. The paper was submitted to and accepted by the Construction Law Journal.

The purpose of this research was to establish construction-specific legal risks relevant to SMEs in Europe to endeavour to manage them. The critical literature review themes that emerged included procurement, building information modelling and regulation and construction contract issues including delay, claims and dispute resolution.

Mixed qualitative methods comprising case studies followed by a focus group were chosen. The project establishes that the relevant legal risks for construction SMEs in Italy are: procurement, building regulations, construction contract and dispute resolution. However, non-payment by clients was also identified as an important risk. These results will contribute to the development of a risk management system which will be tested and validated in SMEs in the construction sector.

This paper could be considered to be a capstone paper (Smith, 2015) summarising my core research theme. It provides *"conceptual coherence to the research for it to be a contribution to knowledge".* (Leshem and Trafford, 2007, p.93).

## 4.4 Regeneration of Brownfield Land: the Environmental Law Challenges

The paper submitted is **Charlson, J**. (2018) Regeneration of Brownfield Land: the Environmental Law Challenges. *Journal of Property, Planning and Environmental Law,* **10** (3) pp 202-218.

The purpose of the research was to investigate environmental law issues surrounding the regeneration of brownfield land. A critique of the literature on relevant environmental law issues including contaminated land, waste management, water pollution, environmental impact assessment issues was undertaken.

A qualitative paradigm was selected to explore contaminated land, waste management, regulators and legislation in a focus group comprising industry, legal expert and academic contributors.

The environmental law challenges developers face when endeavouring to progress housing on brownfield sites include contaminated land, funding, waste treatment permits, water pollution and environmental impact assessments. The advantages of the remediation of brownfield sites for housing seem to be a political priority. However, the legal complexities of Brexit will take precedence over the reform of environmental law.

## 4.5 Interpreting contractors' mandated standard of design

The paper submitted is **Charlson J**. (2019) Briefing: Interpreting contractors' mandated standard of design. *Proceedings of the Institution of Civil Engineers – Management, Procurement and Law*, **172** (4) pp 142-145.

This article examines contractors' standard of design responsibility by reference to current standard forms of contract and analysis of recent relevant case law. Failure to understand and/or comply with contractual obligations has been ranked as the top third cause of construction disputes. The difference between reasonable skill and care and fitness for purpose responsibilities is explained. A fitness for purpose standard accepted by contractors cannot be passed on to a designer who will only accept a reasonable skill and care responsibility. Professional indemnity insurance policies will cover a failure to exercise reasonable skill and care but usually exclude protection for fitness for purpose obligations.

A qualitative methodology comprising document analysis followed by legal research was selected. JCT, NEC and FIDIC forms of contract are examined. Significantly, these standard forms of contract adopt different stances on the serious matter of a contractor's mandated standard of design. Technology and Construction Court, Supreme Court and Scottish Inner House, Court of Session decisions are analysed. The three cases held the contractor liable for a fitness for purpose obligation. Therefore, contractors should carefully construe a contract's conditions and schedules for their mandated standard of design before agreement.

# 5 Research Methodology

As the published journal papers have limited space for their research methodology, an extended section has been included in this commentary to cover the broad spectrum.

## 5.1 Outline of Research

University of Oxford (2016) defines research as *"The systematic investigation into and study of materials and sources in order to establish facts and reach new conclusions."* Fellows and Liu (2015) recognise the challenge of selecting a theme and then developing a feasible research proposal. Alvesson and Skoldberg (2009, p.1) explain that *"Traditionally research has been conceived as the creation of true, objective knowledge, following a scientific method."*

Fawcett and Pockett (2015, p.7) argue that *"Devising and carrying out a research project is often a question of confidence."* They (p.11) explain that *"Researchers want to explore, investigate and analyse areas that they have a strong interest in and where they believe there are new developments to be made, new insights to be had, or where what is currently going on clearly warrants further exploration."*

An initial research design framework can be to consider philosophical paradigms, select a research design followed by choice of research methods. The research strategy is also influenced by the research problem, the researcher's personal experiences and the audience (Creswell, 2014). However, Fawcett and Pockett (2015, p. 49) contend that *"carrying out a research project can be seen to be like creating an entity out of a selection of apparently random pieces."*

## 5.2 Epistemology and Ontology

Crotty (1998, p.3) defines epistemology as *"the theory of knowledge embedded in the theoretical perspective and thereby in the methodology."* He identifies objectivism, constructionism and subjectivism epistemologies. Knight and Turnbull (2008) explain that epistemology is primarily about theories of knowledge. They categorise modern epistemological theories as rationalism and empiricism.

Crotty (1998, p.10) defines ontology as "*the study of being"* and explains that ontological and epistemological issues are compatible and tend to arise together. For example, *"Realism (an ontological notion asserting that realities exist outside the mind) is often taken to imply objectivism (an epistemological notion asserting that meaning exists in objects independently of any consciousness."* (Crotty, 1998, p.10). Knight and Turnbull (2008, p.66) concur that ontology is concerned with *"existence or being".*

Brawn and Clarke (2013, p.27) explain that *"Ontological positions specify the relationship between the world and our human interpretations and practices."* They argue that the ontology continuum ranges from relativism (where reality entirely depends on human interpretation and knowledge) through critical realism to realism (where reality is totally independent of human ways of knowing about it). They describe realism as underpinning most quantitative research whereas relativism founds some qualitative approaches.

Crotty (1998, p.8) explains that *"Objectivist epistemology holds that meaning, and therefore meaningful reality, exists as such apart from the operation of any consciousness."* Bryman (2016, p. 29) explains *"Objectivism is an ontological position that implies that social phenomena confront us as external facts that are beyond our reach or influence."*

By contrast, Crotty (1998, p.8) argues that constructionism repudiates this stance;

*"Truth, or meaning, comes into existence in and out of our engagement with the realities of the world. There is no meaning without a mind. Meaning is not discovered, but constructed. In this understanding of knowledge, it is clear that different people may construct meaning in different ways, even in relation to the same phenomenon."*

Bryman (2016, p.29) concurs that *"Constructionism is an ontological position … that asserts that social phenomena and their meanings are continually being accomplished by social actors."*

Crotty (1998, p.9) explains that *"In subjectivism, meaning does not come out of an interplay between subject and object but is imposed on the object by the subject."*

Brawn and Clarke (2013, p. 31) conclude that *"Ontology and epistemology are far from independent of each other, and they lead into particular methodologies and together constrain the methods that are appropriate for your research."*

The author adopted a constructionist or subjective epistemology and relativist ontological stance for her research.

## 5.3 Philosophical Paradigms

Crotty (1998, p.3) defines the theoretical perspective as *"the philosophical stance informing the methodology and thus providing a context for the process and grounding its logic and criteria."* A first stage is to consider philosophical paradigms. Fellows and Liu (2015, p.18) define a paradigm as *"a theoretical framework which includes a system by which people view events (a lens)."* Creswell (2014) identifies the following worldviews: postpositvism, constructivism, transformative and pragmatism.

Alvesson and Skoldberg (2009) identify three underlying philosophies of science as positivism and post-positivism, social constructivism and critical realism.

Crotty (1998) recognises the current identification of positivism with quantitative methods of research. Indeed he argues (p.27) *"One thing is certain: positivism is linked to empirical science as closely as ever. The logical positivists have always been great lovers of science."* Alvesson and Skoldberg (2009, p. 15) concur that *"the main thrust of positivism is quantitative".*

However, Crotty (1998, p.29) criticises the prestige positivism attributes to scientific results. *"Articulating scientific knowledge is one thing; claiming that scientific knowledge is utterly objective and that only scientific knowledge is valid, certain and accurate is another".*

Postpositivism is a deterministic philosophy in which causes determine outcomes (Creswell, 2014). *"It is also reductionistic in that the intent is to reduce the ideas into a small, discrete set to test, such as the variables that compromise hypotheses and research questions"* (Creswell, 2014, p.7). These assumptions represent the traditional form of investigation and are more closely aligned with quantitative than qualitative research. However, Crotty (1998, p. 30) highlights that *"There is a chasm between what science purports to do and what it actually does."*

Crotty (1998, p.42) defines constructionism as *"all knowledge, and therefore all meaningful reality as such, is contingent upon human practices, being constructed in and out of interaction between human beings and their world, and developed and transmitted within an essentially social context."* Social constructivists' *"intent is to make sense of (or interpret) the meanings others have about the world."* (Creswell, 2014, p.8).

Alvesson and Skoldberg (2009) agree that social constructivism is primarily qualitative. In summary, constructivism is often an approach for qualitative researchers seeking complexity of views.

From the constructionist perspective, meaning is not discovered but constructed by human beings as they interact with their surroundings (Crotty, 1998). In this context, Crotty (1998, p.48) criticises the *"rampant subjectivism"* indicative of current qualitative research.

A transformative worldview believes that research needs to be connected with politics and a campaigning change agenda to confront social oppression (Creswell, 2014).

*"Pragmatism is not committed to any one system of philosophy and reality. This applies to mixed methods research in that inquirers draw liberally from both quantitative and qualitative assumptions when they engage in their research."* (Creswell, 2014, p.11).

Alvesson and Skoldberg (2009, p. 16) explain that *"Critical realism .. asserts that there is a world independent of human beings, and also that there are deep structures in this world that can be represented by scientific theories."*

In addition, Crotty (1998) identifies interpretivism, critical inquiry, feminism and postmodernism as theoretical perspectives.

Crotty (1998, p.67) describes that the interpretivist approach *"looks for culturally derived and historically situated interpretations of the social life-world".* Within this approach, phenomenology *"requires us to engage with phenomena in our world and make sense of them directly and immediately* (Crotty, 1998, p.79). However, Crotty (1998, p.83) explains that in the English-speaking world, *"phenomenology is generally seen as a study of people's subjective and everyday experiences."*

The foundations of critical enquiry were laid by Karl Marx (Crotty, 1998). Crotty, (1998, p.157) explains *"Critical forms of research call current ideology into question, and initiate action, in the cause of social justice."* Concern is focused on the power balance in

relationships and oppression. The perhaps utopian goals of critical inquiry are the just society, freedom and equity.

Crotty (1998, p.161) suggests that *" Feminism speaks with one voice in characterising the world it experiences as a patriarchal world and the culture it inherits as a masculinist culture, but this unity is short-lived".* Tong (1995 in Crotty, 1998) identifies seven strands of feminism: liberal, Marxist, radical, psychoanalytic, socialist, existentialist or postmodern. Feminist research's ambitions are equality and liberation.

Crotty (1998, p.183) contends that *"Postmodernism is the most slippery of terms."* He contrasts modernism with postmodernism *"Instead of espousing clarity, certitude, wholeness and continuity, postmodernism commits itself to ambiguity, relativity, fragmentation, particularity and discontinuity."*

The second step is to select a methodology *"the strategy, plan of action, process or design lying behind the choice and use of particular methods and linking the choice and use of methods to the desired outcomes."* (Crotty, 1998, p.3). The research design options include qualitative, quantitative or mixed methods studies.

For the research, the author selected constructivist and pragmatic philosophical paradigms and qualitative methodologies.

## 5.4 Review of the Literature

The literature review aids reaching a decision about whether a topic merits examination and provides insight into how the researcher can limit the scope to a required area of investigation (Creswell, 2014). A key consideration is whether the topic adds to the current research knowledge. Fink (2014, p. 191) explains that *"Literature review syntheses provide evidence that a proposed study is needed and significant."*

The literature review Creswell (2014, p. 28) explains "*provides a framework for establishing the importance of the study as well as a benchmark for comparing the results with other findings."* Creswell (2014, p.26) argues that a working title is *"an orienting device"*.

A suggested methodology is to determine the topic, decide on the best sources of information, evaluate the quality of the material and then synthesize the results. Key word search terms are derived from the research question. Screening criteria can include quality of the publication for example peer-reviewed journals, research design, content and date of publication (Fink, 2014).

Creswell (2014) suggests that the literature review should conclude with a synopsis of the main concepts and indicate how the research will fill a gap in the themes.

Literature reviews were undertaken of the following topics and are reported in the journal papers or this commentary:

- Professional body accreditation of construction and engineering undergraduate degrees to establish the scope of law expected in the curriculum;

- Guidance for expert witnesses who engage in dispute resolution;
- Identification of legal risks for SMEs in the construction industry;
- Environmental law issues surrounding the regeneration of brownfield land;
- Contractors' standard of design responsibility; and
- PhD by Publication

In summary, Fawcett and Pockett (2015, p. 49) argue that "*A literature review assists in both taking forward the good idea, refining it into an overarching research question and justifying the reason rationale for proceeding with the research project."*

## 5.5 Purpose, Research Questions and Theory

### 5.5.1 The purpose statement

The purpose statement could be described as *"the central, controlling idea in a study"* (Creswell, 2014, p.123). Fawcett and Pockett (2015, p. 9) agree that *"all research has to have a clear purpose."* Fellows and Liu (2015) suggest undertaking a SWOT (Strengths, Weaknesses, Opportunities and Threats) analysis. They explain (2015, p.45) that *"Objectives ..translate the aim into coherent, operational statements."*

The purpose of the research is to compare and contrast construction and engineering law from an academic to industry perspective.

### 5.5.2 Research Questions and Hypotheses

Bryman (2016) argues that research questions should show the following attributes: clarity; researchable; some connection with established theory and research; linked to each other; hold the prospect of making an original contribution to knowledge and neither too broad nor too narrow.

*"In a qualitative study, inquirers state research questions"* (Creswell, 2014, p.139). *"In qualitative research, the intent is to explore the general, complex set of factors surrounding the central phenomenon and present the broad, varied perspectives or meanings that the participants hold"* (Creswell, 2014, p.140).

*"In quantitative studies, investigators use quantitative research questions and hypotheses, and sometimes objectives, to shape and specifically focus the purpose of the study"* (Creswell, 2014, p.143).

The research question is *"What is the congruence and distinction between the law underpinning construction and engineering law in academia and industry?"* and the objectives are:

- Analysis of construction and engineering law required by professional institutions to be taught in academia to undergraduates;
- Guidance for expert witnesses who engage in dispute resolution;
- Identification of construction-specific legal risks relevant to SMEs in Europe with a view to manage them;
- Environmental law issues surrounding the regeneration of brownfield land; and

- Interpreting contractors' mandated standard of design.

The research question for each topic is set out in each journal papers.

### 5.5.3 The use of theory

Fellows and Liu (2015, p.22) explain that *"A primary use of theory is to facilitate prediction".* "*In quantitative research, researchers often test theories as an explanation for answers to their questions*." (Creswell, 2014, p.51).

Creswell (2014, p.54) explains "*a theory in quantitative research is an interrelated set of constructs (or variables formed into propositions, or hypotheses, that specify the relationship among variables (typically in terms of magnitude or direction). A theory might appear in a research study as an argument, a discussion, a figure, or a rationale, and it helps to explain (or predict) phenomena that occur in the world."* Theories can differ in their extent from micro-level to meso-level (organizations or communities) to macro-level (social institutions, cultural systems and whole societies).

In quantitative research, the aim is to test or confirm a theory rather than developing it so, the researcher proposes a theory, collects data to test it and then deliberates on its verification or contradiction (Creswell, 2014).

Qualitative researchers use theory in different manners including (Creswell, 2014):

1. As a wide explication of behaviour and opinions; or
2. As a theoretical lens or perspective; or
3. Theory is presented in the conclusion; or
4. They do not employ any explicit theory

"*In mixed methods research, researchers may both test theories and generate them*." (Creswell, 2014, p.51)

The author used a qualitative approach for her research.

## 5.6 Research Approaches, Methods and Designs

### 5.6.1 Research Approaches

The philosophical assumptions, research designs and methods contribute to a research approach which tends to be quantitative, qualitative or mixed (Creswell, 2014).

A quantitative approach makes postpositive knowledge claims and uses surveys and experiments. Close-ended questions and numerical data methods are adopted. The researcher tests or verifies theories, uses standards of validity, observes and measures information numerically, uses unbiased approaches and undertakes statistical analysis. (Creswell, 2014)

A qualitative approach adopts constructivist or transformative philosophical assumptions and employs phenomenology, grounded theory, ethnography, case study and narrative strategies of enquiry. Open-ended questions are asked. The researcher typically collects respondents' understandings, focuses on a single theory, studies the context of the participants, validates

the accuracy of the data and interprets the findings. (Creswell, 2014). Silverman (2011, p.25) emphasises that *"'qualitative' research should offer no protection from the rigorous, critical standards that should be applied to any enterprise concerned to sort 'fact' from 'fancy'."*

A mixed methods approach endorses a pragmatic stance and uses sequential or concurrent research designs. The researcher benefits from both strategies of qualitative and quantitative research.(Creswell, 2014)

### 5.6.2 Criteria for selecting a research approach

A research problem is an issue or concern developed from a gap in the literature which should be explored (Creswell, 2014).

A quantitative approach is best to test a theory. Silverman (2011, p.55) explains that *"Theory provides a framework for critically understanding phenomena and a basis for considering how what is unknown might be organised."* By contrast, if a new concept is to be investigated and understood then a qualitative approach is warranted. Qualitative research is particularly effective when the issue is new. A mixed methods approach facilitates the collection of both closed-ended quantitative and open-ended qualitative data.

A researcher's qualifications and experience influence their choice of approach. A mixed methods researcher enjoys both the structure of quantitative research and the flexibility of qualitative inquiry. The target audience of the research for example, journal editors and readers, may also have a preference for a specific research approach.

The author chose a qualitative research approach.

### 5.6.3 Research Methods

Crotty (1998, p.3) explains that methods are *"the techniques or procedures used to gather and analyse data related to some research question or hypothesis."* Fellows and Liu (2015, p. 17) define a hypothesis as *"a supposition/proposition made, as a starting point, for further investigation, from known facts."*

Quantitative, qualitative and mixed methods have different characteristics (Creswell, 2014):

- Quantitative methods include instrument based questions, attitude data, statistical analysis and interpretation
- Qualitative methods comprise open-ended questions, interview and document data followed by theme or pattern interpretation
- Mixed methods combine both open- and closed-ended questions, multiple forms of data, statistical and text analysis with across databases interpretation

Crotty (1998) adds focus group, case study and document analysis research methods.

The author selected qualitative methodologies including document analysis, interviews, case studies and focus groups.

### 5.6.4 Qualitative Design

Creswell (2014, p. 4) explains *"Qualitative research is an approach for exploring and understanding the meaning individuals or groups ascribe to a social or human problem."* Fawcett and Pockett (2015, p. 5) concur *"Qualitative researching places emphasis on insights, meanings and interpretations."* Silverman (2011, p. 413) argues that *"qualitative research's greatest strength is its ability to analyse what actually happens in naturally occurring settings."*

Bryman (2016) points out that a qualitative approach is often inductive generating theory. He (p.374) explains that *"Qualitative research is a research strategy that usually emphazises words rather than quantification in the collection and analysis of data. As a research strategy it is broadly inductivist, constructivist and interpretivist."*

Silverman (2011) presents three roles for the social scientist: scholar, state counsellor or partisan. He also identifies the following audiences: academic colleagues, policy-makers, practitioners and the general public.

Narrative research where the lives of individuals are studied is of limited relevance to construction and engineering law. Phenomenological research where *"the researcher describes the lived experiences of individuals about a phenomenon as described by the participants."* (Creswell, 2014, p. 14) has been an applicable design for the field. Phenomenological designs include grounded theory, ethnography and case studies. Ethnography is where the researcher studies the shared patterns of behaviours, language and actions of a cultural group in a natural setting over a prolonged period of time.

More simply, Silverman (2011, p.42) suggests that there are four main methods used by qualitative researchers *"observation; analysing texts and documents; interviews and focus groups; audio and video recording (and other visual material).* He does, however, concede that these methods are often used together for example, case studies incorporating observation and interviewing.

Data collection should cover the sampling approach and forms of data to be acquired for example, observations and documents. Data analysis, interpretation and validity strategies should be planned (Creswell, 2014).

All the submitted papers have a qualitative design.

### 5.6.5 Quantitative Design

Fawcett and Pockett (2015, p. 71) explain their view that *"Clearly quantitative orientations have a historical basis in positivism, but we argue for the adoption of what can be called a post-positivist perspective. This recognizes the prioritization and application of standardized statistical tests as a means of demonstrating validity, reliability and generalizability, whilst also acknowledging that personal, social and cultural values influence both the world-view and ontological position of the researcher. "*

Creswell (2014, p.4) describes quantitative research as an approach *"for testing objective theories by examining the relationship among variables."* Bryman (2016) concurs that

quantitative research encompasses a deductive approach where the emphasis is on the testing of theories. The designs include survey and experimental research. The most relevant design to construction and engineering law is survey research which *"provides a quantitative or numeric description of trends, attitudes, or opinions of a population by studying a sample of that population."* (Creswell, 2014, p.13)

Suggested steps for survey design include defining the purpose, identifying the population and sample, designing the survey and planning the analysis and interpretation. Threats to validity should be minimised (Creswell, 2014). Fawcett and Pockett (2015, p. 74) explain *"Measurement validity is associated with ensuring that we measure what we set out to measure."*

None of the submitted papers had a quantitative design.

#### 5.6.6 Mixed Methods Designs

Creswell (2014, p.4) defines mixed methods research as "*an approach to inquiry involving both quantitative and qualitative data, integrating the two forms of data, and using distinctive designs that may involve philosophical assumptions and theoretical frameworks."*

This approach has the advantage of seeking convergence across qualitative and quantitative methods by triangulating data sources (Creswell, 2014). Three primary models are:

1. Convergent parallel mixed method where data is collected concurrently and then combined for analysis.
2. Explanatory sequential mixed methods where initial quantitative data is further considered in a subsequent qualitative phase.
3. Exploratory sequential mixed methods where a qualitative research phase probes the views of the participants which are then interpreted to design a second quantitative stage.

The third phase is to choose the research methods to collect, analyse and interpret the data.

Fawcett and Pockett (2015, p. 81) explain that mixed methods approaches *"combine the collection of quantitative factual data with a qualitatively orientated drilling-down to explore meanings, perceptions and understanding so that the research question is explored from a variety of angles."* Silverman (2011, p.369) argues that *"Triangulation usually refers to combining multiple theories, methods, observers and empirical materials, to produce a more accurate, comprehensive and objective representation of the object of study".*

#### 5.6.7 Legal Research

Knowles (2016) identifies sources of legal knowledge including case law, legislation, journals, UK official publications and European Union law. He explains that case law is found in law reports which can be accessed via Lexis Library and Westlaw UK. In addition, journals provide commentary on cases and advanced discussion of legal issues. UK legislation can be found on the legislation.gov.uk website.

Chynoweth (2008) identifies doctrinal (research in law) and interdisciplinary (research about law) legal research methodologies. He explains that for example, interdisciplinary legal research might include an assessment of efficacy of a statute.

Legal research can also be categorised as pure or applied with academic and professional constituencies respectively. He also classifies law as belonging to the social and creative professions.

He summarises (p.35) that *"The 'methods' employed in legal scholarship are therefore neither consciously learned, nor consciously employed as is the case with scientific methods. The skills and conventions of legal analysis are instead learned at an instinctive level through exposure to process, and they are then employed on the same basis in the development of legal argument."*

It can be argued that papers 4 and 5 have a legal research focus.

## 5.7 Data Collection

### 5.7.1 Ethics

Fawcett and Pockett (2015, p. 27) argue that *"Contemporary expectations include the essential requirement that all research is conducted ethically."*

Silverman (2011) warns that historical, political and contextual sensitivities may be relevant in social science research. Some of the ethical pitfalls he identifies include: exploitation; deception; researching vulnerable people; revealing people's identities; fraternising with groups we dislike and participating in dubious bargains. Bryman (2016) identifies the following ethical principles: whether there is harm to participants; whether there is lack of informed consent; whether there is an invasion of privacy; and whether deception is involved.

Silverman (2011) advocates achieving ethical goals including voluntary and confidential participation by following ethical guidelines and responsible research practice. Ethically responsible research practice includes three distinct stages: framing your research topic; analysing data and when the investigation is completed.

All the research received relevant ethical approval.

### 5.7.2 Sampling

A sample is subgroup of a population. There are two primary types: random or probability and convenience sampling. Random samples are considered relatively unbiased (Fink, 2014). Bryman (2016) identifies convenience, snowball and quota as types of non-probability sampling. Fawcett and Pockett (2015, p. 56) argue that *"…as qualitative researching does not look to generate validity, reliability and generalizability, statistical or random sampling does not feature. Instead, participants tend to be included on the basis of a purposive or snowballing sampling process which takes into account of aspects associated with accessibility."*

However, Silverman (2011) advocates purposive sampling as it allows a case to be chosen which epitomizes an interesting component or procedure. He (p.390) explains that theoretical sampling has three aspects: *"choosing cases in terms of your theory; choosing 'deviant' cases; and changing the size of your sample during research."*

Other factors to consider include the probable response rate and sample size (Fink, 2014). Fawcett and Pockett (2015) explain that for quantitative research, the sample should be sufficiently extensive for statistical inferences to be made.

The sampling and associated samples are detailed in the research papers.

### 5.7.3 Interviews

Fawcett and Pockett (2015, p.68) explain that *"Research interviews are generally referred to as conversations with a purpose".* The researchers in paper 2 conducted interviews. Interviews can be characterised (Silverman, 2011) as follows:

- Structured with no prompting nor improvisation to ensure consistency
- Semi-structured with some probing and rapport with the interviewee to establish understanding of the purpose of the research
- Open-ended which are flexible, encourage rapport with the interviewee and require active listening

Silverman (2011) observes that no special skills are required for qualitative interviews; the interview is collaboratively produced; interviewers are active participants and no one interviewing style is 'best'. However, Bryman (12016) reports that it is often advised it is necessary for the interviewer to achieve rapport with the respondent.

Silverman (2011) argues that interview data can be interpreted according to three different philosophical paradigms:

1. Positivism regards interview data as giving access to the facts provided that the data can be demonstrated to be valid and reliable. Standardised questions and random samples are used.
2. Emotionalism's perspective is that interviewees actively create their social world. Authentic insight into people's experiences can be obtained by unstructured, open-ended interviews.
3. Constructionism argues that interviewers and interviewees are consistently engaged in mutually constructing meaning.

He suggests that positivism regards interviewer and interviewee as objects whereas emotionalism considers them both to be subjects. Braun and Clarke (2013) highlight that different groups of participants can raise particular issues for example, acquaintances, strangers, power dynamics and participant distress.

### 5.7.4 Focus Groups

Silverman (2011) describes a focus group as where participants are given a topic or stimulus information and then encouraged to discuss it between themselves. Focus groups can

highlight normative understandings used to reach collective conclusions. *"Discussions occurring within focus groups will provide rich data on the group meanings associated with a given issue".* (Bloor et al., 2001, p.7).

Focus groups can be used as a pre-pilot substitute for interviews in preparation for a subsequent more extensive survey or as an interpretive tool of survey results. In addition, focus groups can be incorporated into a multi-method design to triangulate with data on the same topic obtained by other methods. Focus groups can also be used to disseminate research results while simultaneously developing new perspectives on early findings. (Bloor et al., 2001). For papers 3 and 4, the author used focus groups for such dissemination and data collection.

Focus groups are seemingly engaging events to foster public participation as they are social, time-limited and demand no technical skill from the participants. However, there is a balance to be achieved between expertise and ignorance of the members. (Bloor et al., 2001)

When recruiting contributors, consideration must be given to participant attributes in relation to the subject. Authors have advised that the best size for focus group discussion is six to eight members. However, ensuring attendance is a challenging exercise. (Bloor et al., 2001)

Further issues include the choice of an appropriate and accessible venue, whether the session is audio recorded and then transcribed and consideration of the use of focusing exercises. It is argued that a facilitator should facilitate but not seek to control a group. *"The facilitator of a focus group does not need, and should not seek, to control the group: sometimes the facilitator may emerge from a most successful group feeling that she has been holding a tiger by the tail for the last hour and a half."* (Bloor et al., 2001, p.48) The participants should agree to the length of the session and payment of expenses and possibly a fee considered.

Silverman (2011) argues that most qualitative focus group studies use thematic data analysis. He suggests that this analysis:

- Endeavours to uncover the participants' lives;
- Focuses interpretation on the particular situation and in the participants' (rather than researchers') perspectives; and
- Presents data as social experience validated by illustrative quotations from the focus group discussion.

#### 5.7.5 Case Studies

Case studies (Creswell, 2014) bounded by time and activity have been used to collect detailed information using a variety of data collection procedures over a sustained period of time. For paper 3, the author deployed case studies followed by a focus group.

Gerring (2007) maintains that recent epistemological changes have improved the appeal of the case study format. However, he recognises (p.6) that:

*"A work that focuses its attention on a single example of a broader phenomenon is apt to be described as a "mere" case study, and is often identified with loosely framed and*

*nongeneralizable theories, biased case selection, informal and undisciplined research designs, weak empirical leverage (too many variables and too few cases), subjective conclusions, nonreplicability, and casual determinism."*

Nevertheless, Gerring (2007) asserts that the outcome of a successful case study is insight. He argues (p.37) that *"the case study approach to research is most usefully defined as an intensive study of a single unit or a small number of units (the cases), for the purpose of understanding a larger class of similar units (a population of cases)."* Gerring (2007, p.66) compares a case study versus cross-case studies and contends that *"case studies are more useful when the purpose of research is hypothesis generating rather than hypothesis testing, .. when propositional depth is prized over breadth .. and when good-quality evidence is concentrated rather than dispersed."*

Proverbs and Gameson (2008) advise that when deciding whether to commence a case study the following should be examined: time available to carry out the investigation; availability of documentary information; access to persons involved; aim of the investigation and the number of cases.

Yin (2014) contends that a case study design should be subject to four tests:

1. construct validity (identifying correct operational measures for the concepts being studied);
2. internal validity (seeking to establish a causal relationship);
3. external validity (can the results be generalized); and
4. reliability (demonstrating that the operations can be repeated, with the same results)

Yin (2014) explains that case study evidence may come from six sources: documents, archival records, interviews, direct observation, participant-observation and physical artifacts. He warns that diverse data collection techniques need to be deployed. A key strength is the use of multiple sources of evidence to triangulate the results.

The challenge of analysing case studies is recognised however, four general strategies: depend on theoretical propositions, adopt an inductive approach, generate a case description and test rival explanations are suggested. Five techniques: pattern matching, explanation building, time-series analysis, logic models and cross-case synthesis can be used with any of these strategies. A high-quality analysis addressing all the evidence, all plausible rival interpretations, the most significant aspect and using your own prior, expert knowledge is advocated. Six compositional arrangements for reporting case studies are suggested: linear-analytic, comparative, chronological, theory-building, "suspense" and unsequenced. (Yin, 2014)

### 5.7.6 Questionnaires

Questionnaires should have primarily closed-ended questions, easy to follow designs and be succinct to encourage completion. Although potentially cheap to administer, there are neither opportunities to prompt nor probe and low response rates can be a challenge. Use of the

Likert scale to facilitates data analysis. A pilot study to test a questionnaire is recommended. (Bryman, 2016).

The results from questionnaires are often interpreted using statistical analysis software for example, SPSS (Hoxley, 2008). Leishman (2008, p. 144) explains *"Most researchers utilising quantitative data will use a combination of descriptive and inferential statistics."*

### 5.7.7 Document Analysis

Bryman (2016) recognises documents as sources of data and distinguishes between personal and official documents. He describes the criteria for evaluating the quality of documents as: authenticity; credibility; representativeness; and meaning.

The availability a document varies from being in the public domain, a commercial purchase, restricted access to secret. Once accessed and their quality assured, documents may then be subject to content analysis (Denscombe, 2017).

Silverman (2011) advocates the advantages of textual data: richness; relevance and effect; natural occurrence and availability. The main research methodology deployed in paper 1 and one of the methods in papers 2 and 5 was document analysis.

### 5.7.8 Grounded Theory

Grounded theory is where "*the researcher derives a general, abstract theory of a process, action or interaction grounded in the views of participants*" (Creswell, 2014, p.14). Charmaz (2006, p. 2) offers the definition *"Grounded theory methods consist of systematic, yet flexible guidelines for collecting and analyzing qualitative data to construct theories 'grounded' in the data themselves."* Hunter and Kelly (2008, p.86) concur that *"Grounded theory is a methodology which involves a systematic process of gathering and analysing a finite set of data to evolve a theory based upon the data."*

Grounded theorists collect and code data to make comparisons leading to an analytical interpretation. The process can include writing preliminary analytical notes called memos. Further data can then be sought to fill gaps. There are no preconceived hypotheses and the literature review may be undertaken after the independent analysis. The conclusion is a 'grounded theory'. (Charmaz, 2006)

Charmaz (2006, p. 6) explains that the theory's founders, the sociologists Glaser and Strauss, aimed *"to move qualitative inquiry beyond descriptive studies into realm of explanatory theoretical frameworks, thereby providing abstract, conceptual understanding of the studied phenomena."*

The gathering of rich data to get behind the exterior of social and subjective life is advocated. Initial followed by focused coding is suggested. The coding shapes the analysis. Memos document and particularize the analytic stage. Theoretical sampling seeks relevant data to advance emerging theory. Saturation has been reached when new data does not stimulate different perceptions (Charmaz, 2006).

There is a debate about whether grounded theory fits within interpretive or positivist traditions. Charmaz (2006, p.126) argues that *"Positivist theory seeks causes, favors deterministic explanations, and emphasizes generality and universality"* and by contrast *"Interpretive theory calls for imaginative understanding of the studied phenomenon."*

Constructivist grounded theory derives from the interpretive movement and objectivist grounded theory comes from positivism. Charmaz (2006, p.130-131) explains that *"A constructivist approach places priority on the phenomena of the study and sees both data and analysis as created from shared experiences and relationships with participants"* whereas *"objectivist grounded theory resides in positivist tradition and thus attends to data as real in and of themselves and does not attend to the processes of their production."*

Charmaz (2006) concludes that the grounded research process is flexible with the researchers forming part of the study. She describes that the research question informs the early data collection methodology although many approaches may be later adopted. She explains that the heart of grounded theory analysis is consecutive layers of abstraction through comparative analysis. She argues that a grounded theory study can be evaluated against the following criteria: credibility, originality, resonance and usefulness.

Silverman (2011, p.73) concludes that *"At its best, grounded theory offers an approximation of the creative activity of theory-building found in good qualitative work, compared with the dire abstracted empiricism present in the most wooden statistical studies."*

The author used grounded theory for the paper titled *"Design, manufacture and construct procurement model for volumetric offsite manufacturing in the UK housing sector"* which has been accepted for publication, subject to revision, by the Construction Innovation: Information, Process, Management journal.

#### 5.7.9 Auto-ethnography

Hammersley and Atkinson (2007) explain that although ethnography does not have a standard definition, ethnographers participate in other people's daily lives for an extended period of time.

Auto-ethnographers deliver accounts of events and interactions in which they are intimately involved. Prima facie, if you are researching yourself then informed consent is automatically given. However, auto-ethnography often presents interactions with others from the author's perspective. This leads to the issue of whether the auto-ethnographer has the authority to represent those others in their research (Murphy and Dingwall, 2001). This commentary includes an element of auto-ethnography.

## 5.8 Data Analysis

#### 5.8.1 Interpreting Qualitative Data

Fawcett and Pockett (2015, p.87) explain that *"In qualitative studies, phenomena and concepts are explored thematically within theoretical and contextual frameworks that seek to find deeper understanding and meaning of the experiences and realities of participants in particular situations."* King (2008, p.135) recommends the use of software to analyse

qualitative data "*Various packages are available and are increasingly being used owing to their ability to store, organise and manage the fracture and analytic reassembly of large amounts of data, whilst offering high levels of transparency."*

Silverman (2011) advocates some rules for data analysis: early analysis; test alternative theoretical approaches; avoid early hypotheses; do not seek telling examples; initially focus on a limited sample of the data and endeavour to focus on sequences. He suggests three ways of analysing qualitative data: content analysis, grounded theory and narrative analysis. Content analysis is an established method of textual examination where categories are fixed and the number of occurrences in each division is counted. Content analysis focuses on reliability and validity. Bryman (2016, p. 283) explains *"content analysis is an approach to the analysis of documents and texts … that seeks to quantify content in terms of predetermined categories and in a systematic and replicable manner."*

Silverman (2011) suggests that when working with narrative analysis: select a constructionist framework; consider form and function; and include the local context.

Silverman (2011) also discusses discourse analysis, conversation analysis and semiotics (the science of 'signs'). Fawcett and Pockett (2015, p. 64) explain that *"discourse analysis generally relates to adopting a deconstructive approach which is about taking apart what is there in order to explore underpinning knowledge, power and value bases and how these intersect in the situation under review."*

### 5.8.2 Reliability, Validity and Generalisability

Crotty (1998, p.13) advocates that *"We want the observers of our research to recognise it as sound research. Our conclusions need to stand up. On some understandings of research (and of truth), this will mean that we are after objective, valid and generalisable conclusions as the outcome of our research. On other understandings, this is never realisable."*

A reliable data collection method is one that is mostly free from "measurement error". Silverman (2011) suggests that reliability deals with replicability. Bryman (2016, p.41) concurs that *"reliability is concerned with the question of whether the results of a study are repeatable."* Silverman (2011) explains some social researchers argue that reliability is only a concern for the quantitative research convention.

Whereas validity refers to the extent to which a measure assesses what it purports to measure (Fink, 2014). Bryman (2016, p.41) explains that *"Validity is concerned with the integrity of the conclusions that are generated from a piece of research."* Silverman (2011, p.359) explains that *"validity is identified with confidence in our knowledge but not certainty of its truth".*

Silverman (2011) explains that generalisability is a typical objective of quantitative research and it is usually achieved by statistical sampling processes. The sampling has two purposes: firstly, representativeness which allows secondly, the ability to make broader inferences. He acknowledges that generalisability in qualitative research is more of a challenge but can be sought through deductive inference (to refute an accredited or standard theory), comparative

inference and the emblematic case. He also argues that generalisability of qualitative research can be increased by purposive or theoretical sampling.

### 5.8.3 Statistical significance

Gerring (2007, p. 11) explains that *"the purpose of a statistical sample is to reveal elements of a broader population."* Fellows and Liu (2015) suggest producing a diagram or graph of data. Measures of central tendency include the mean, median and mode. Measures of dispersion include the range and standard deviation (Bryman, 2016).

Fawcett and Pockett (2015, p.87) explain that *"In the case of quantitative studies, dependent and independent variables are identified in a hypothetical relationship that is investigated with the aim of proving causal relationships between them."*

"*Pearson's r*" is a method for examining relationships between interval/ratio variables. *"Spearman's rho"* is designed for the use of pairs of ordinal variables. (Bryman, 2016)

Statisticians test the hypothesis that no differences exist between groups; the *"null hypothesis".* A level of significance and the value the test statistic must obtain to be significant is then chosen. The level of significance is set in advance as say, .05, .01 or .001. Calculations are then undertaken to establish if the difference are statistically significant (Fink, 2014). The chi-square test establishes the confidence of a relationship between two variables in a population (Bryman, 2016).

## 5.9 Research approach and methods

The research question is *"What is the congruence and distinction between the law underpinning construction and engineering in academia and industry?"* which has been addressed by comparing and contrasting construction and engineering law from an academic to industry perspective.

The author adopted a constructionist or subjective epistemology and relativist ontological stance. Constructivist and pragmatic philosophical paradigms and qualitative methodologies were selected including document analysis, interviews, case studies and focus groups. It can also be argued that papers 4 and 5 have a legal research focus. In addition, this commentary includes an element of auto-ethnography.

The table below outlines the research methods deployed for each paper and this commentary. The research methods are further detailed in the subsequent paragraphs.

**Table 1:** Overview of research methods deployed for each journal paper

| Paper | Overview of Research Methods Deployed |
|---|---|
| 1 | Qualitative document analysis |
| 2 | Mixed research methods comprising document analysis followed by interviews. |
| 3 | Mixed qualitative methods comprising case studies followed by a focus group |
| 4 | Concurrent focus groups |
| 5 | Qualitative document analysis followed by case law reviews |

| Commentary | A literature review with elements of auto-ethnography |
|---|---|

#### 5.9.1 Paper 1 -"Law for engineering undergraduates on accredited courses"

The research design used in paper 1 "*Law for engineering undergraduates on accredited courses*" was qualitative document analysis. The research began with a literature review followed by selection of the professional institution requirements for accreditation of undergraduate degree programmes in a School of Technology. The documentation was reviewed and the relevant law requirements were extracted, summarised and analysed.

#### 5.9.2 Paper 2 - "Expert Witness Update for 2014"

Paper 2 "*Expert Witness Update for 2014*" adopted mixed research methods comprising document analysis followed by interviews. A qualitative research design to examine experienced construction expert witnesses' views of the topics was developed. The interviewees' responses were recorded, transcribed and then analysed.

#### 5.9.3 Paper – 3 "Construction industry legal risk identification for SMEs"

Paper 3 *"Construction industry legal risk identification for SMEs"* adopted mixed qualitative methods comprising case studies followed by a focus group. The case studies and focus group were undertaken by during two secondments by the first author to a SME contractor in Padova, Italy. A workshop disseminating previous research was held with the invitees contacts of the construction SME with a focus on the Associazione Nazionale Costruttori Edili, a long-established association primarily composed of medium and small firms. A focus group of the attendees was asked about their experience. Their responses were recorded, if required translated from Italian into English, transcribed and then analysed.

#### 5.9.4 Paper 4 – "Regeneration of Brownfield Land: the Environmental Law Challenges"

For paper 4 *"Regeneration of Brownfield Land: the Environmental Law Challenges"* following a literature review, an inductive approach and an interpretivist epistemology with a phenomenological focus were chosen. A constructionist ontological stance was adopted. A qualitative paradigm was selected to explore the issues in a focus group comprising industry, legal expert and academic contributors.

#### 5.9.5 Paper 5 – "Interpreting contractors' mandated standard of design"

Paper 5 *"Interpreting contractors' mandated standard of design"* adopted mixed research methods comprising qualitative document analysis of standard forms of contract followed by case law reviews.

#### 5.9.6 PhD Commentary

It can be argued that this commentary incorporates further research. There is an extended previous chapter on Research Methodology. This commentary also includes elements of auto-ethnography with reflections about the journey towards a PhD by Publication.

# 6 Analysis

The research question of *"What is the congruence and distinction between the law underpinning construction and engineering in academia and industry?"* has been addressed by comparing and contrasting construction and engineering law from academia to industry.

Academic construction and engineering legal issues were selected from paper 1 and researched in the subsequent four papers within the industry context. The table below summarises the theme of each paper with further details in the subsequent paragraphs.

**Table 2:** Themes covered by each journal paper

| Paper | Themes |
|---|---|
| 1 | Analyses construction and engineering law required by professional institutions to be taught in academia to undergraduates. |
| 2 | 2014 update for expert witnesses who engage in dispute resolution |
| 3 | Identifies construction-specific legal risks relevant to SMEs in Europe with a view to manage them. |
| 4 | Investigates environmental law issues surrounding the regeneration of brownfield land |
| 5 | Covers contractors' standard of design responsibility by analysing current standard forms of contract and reviewing recent relevant case law |

## 6.1 Construction and Engineering Law mandated to be taught in Academia

Paper 1 "*Law for engineering undergraduates on accredited courses*" analyses construction and engineering law required by professional institutions to be taught in academia to undergraduates. The overlap between construction and engineering law of legal topics including legal framework, contract, environmental and health and safety law was identified. They differ in that engineering bodies additionally require intellectual property awareness and construction institutions include dispute resolution and land law. The author also argued that the importance of European law should be recognised.

Table 3 shows the Construction and engineering law required by professional institutions covered by text books.

**Table 3:** Construction and engineering law required by professional institutions covered by text books.

| Topic | (Uff, 2013) | (Galbraith et al., 2011) | (Wood et al., 2011) | (Mason, 2016) | (Ashworth and Perera 2018) | Hughes et al., 2015) |
|---|---|---|---|---|---|---|
| Legal framework | ✓ | ✓ | ✓ | ✓ | ✓ | |
| Contract | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| Environmental law | ✓ | | ✓ | | | |
| Health and safety law | ✓ | ✓ | | | ✓ | |

| | | | | | | |
|---|---|---|---|---|---|---|
| Intellectual property | | | | | | |
| Dispute resolution | ✓ | ✓ | | ✓ | ✓ | ✓ |
| Land law | ✓ | ✓ | ✓ | ✓ | | |

The construction law required by professional institutions is covered reasonably well by construction law text books. However, Galbraith et al. (2011), Mason (2016) and Ashworth and Perera (2018) do not address environmental law and Wood et al. (2011) and Mason (2016) do not cover health and safety law. Wood et al. (2011) omits dispute resolution and Ashworth and Perera (2018) leaves out land law. Hughes et al. (2015) just examines contract and dispute resolution.

It is notable that none of the construction law text books include intellectual property which accords with the professional body requirements as this subject is required by engineering but not construction professional bodies. Significantly, there is no text book which meets engineering professional body engineering law requirements.

A future research question proposed was *"Do the legal topics reflect the needs of industry?* Selected legal topics were therefore subsequently researched in the context of industry.

## 6.2 Expert Witnesses

Paper 1 identified the requirement that all candidates for Chartered membership of the RICS must "*demonstrate knowledge and understanding of the techniques for conflict avoidance, conflict management and dispute resolution procedures."* Accordingly, Papers 2 researched expert witnesses who are important participants in dispute resolution.

Paper 2 "*Expert Witness Update for 2014*" although framed in a construction law context also applies to engineering expert witnesses who engage in dispute resolution.

Paper 2 reports research on three significant documents relevant to construction expert witnesses were published in 2014: the *Civil Justice Council's (CJC) "Guidance for the Instruction of Experts in Civil Claims 2014"* in August; the *Royal Institution of Chartered Surveyor's (RICS) 4th edition of "Surveyors Acting as Expert Witnesses"* effective from July and *The Society of Construction Law's (SCL) "Review of Use of Experts in Dispute Resolution"* in June. The following were suggested as barriers affecting experts: regulations, budget controls, availability of evidence and deadlines for reports. Additionally experts felt fees, challenges from experts overseas, a requirement for a more diverse CV and cross examination experience to be the challenges they will face within the next five years.

## 6.3 Construction and Engineering Law from Academia to Industry

Paper 3 *"Construction industry legal risk identification for SMEs"* aimed to identify construction-specific legal risks relevant to SMEs in Europe with a view to manage them. The study confirms that the relevant legal risks for construction SMEs in Italy are: procurement, building regulations, construction contract and dispute resolution. The additional issue of intellectual property protection was recognised in the civil engineering SME case study.

There is a correlation between paper 1 which analysed construction and engineering law required by professional institutions to be taught in academia to undergraduates and paper 3 which explored legal topics for SMEs in the construction industry.

Legal framework

Paper 1 detailed the relevant learning outcomes for a bachelors (honours) degree for CEng as:

- *"Economic, social and environmental context, in particular: 'Awareness of the framework of relevant legal requirements governing engineering activities, including personnel, health, safety and risk (including environment risk) issues'*

Paper 3 begins by outlining the European Union legal framework including the effect of Regulations, Directives and Decisions of the Court of Justice of the European Union and touched on safety in the interviews.

Intellectual property

Paper 1 detailed the relevant learning outcomes for a bachelors (honours) degree for CEng as:

- *Engineering practice, especially: 'Awareness of nature of intellectual property and contractual issues.'"*

Intellectual property protection was recognised in the civil engineering SME case study.

Procurement and Construction Contract

Paper 1 explained that for the RICS quantity surveying and construction pathway the core competencies include *"contract practice – provide evidence of reasoned advice, prepare and present reports on the selection of the appropriate form of contract and warranties for your chosen procurement route. This should include advising on the most appropriate contractual procedure at the various stages of a construction or other contract"*

Paper 3 explores procurement including public or private sector clients and traditional or design and build. The paper also considers the form of construction contract including measurement and fixed cost payment mechanisms and its administration including variations, delay and claims.

Building Control, Environmental and Planning Regulations

Paper 1 identified other relevant RICS core competencies as: *"building control inspections; environmental assessment; and legal/regulatory compliance"*

Paper 3 considered building control, environmental and planning regulations.

Dispute Resolution

Paper 1 identified the requirement that all candidates for Chartered membership of the RICS must "*demonstrate knowledge and understanding of the techniques for conflict avoidance, conflict management and dispute resolution procedures."*

Paper 3 researched dispute resolution including arbitration, litigation, adjudication and mediation.

Summary

Table 4 shows Construction-specific legal risks relevant to SMEs in Europe against legal topic mandated by the professional bodies identified.

**Table 4**: Construction-specific legal risks relevant to SMEs in Europe

| **Topic** | **Professional body** | **Construction-specific legal risks relevant to SMEs in Europe** |
|---|---|---|
| Legal framework | CEng | European Union legal framework including the effect of Regulations, Directives and Decisions of the Court of Justice of the European Union. |
| Intellectual property | CEng | Intellectual property protection was recognised in the civil engineering SME case study. |
| Procurement and construction contract | RICS | Explores procurement including public or private sector clients and traditional or design and build. The paper also considers the form of construction contract including measurement and fixed cost payment mechanisms and its administration including variations, delay and claims. |
| Building control, environmental and planning regulations | RICS | Considered building control, environmental and planning regulations. |
| Dispute resolution | RICS | Researched dispute resolution including arbitration, litigation, adjudication and mediation. |

In summary, Paper 1 identified the overlap between construction and engineering law of legal topics including legal framework, contract, environmental and health and safety law. They differ in that engineering bodies additionally require intellectual property awareness and construction institutions include dispute resolution and land law. The author also argued that the importance of European law should be recognised.

Paper 3 confirms that the relevant legal risks for construction SMEs in Italy are: procurement, building regulations, construction contract and dispute resolution. The additional issue of intellectual property protection was recognised in the civil engineering SME case study.

## 6.4 Regeneration of Brownfield Land: the Environmental Law Challenges

Paper 1 detailed a relevant learning outcome for a bachelors (honours) degree for CEng as:

- *"Economic, social and environmental context, in particular: 'Awareness of the framework of relevant legal requirements governing engineering activities, including personnel, health, safety and risk (including environment risk) issues'*

In addition, Paper 1 identified:

- *"environmental legislation"* as specifically required for IET accredited bachelor degree programmes ;
- a RICS core competency of *"environmental assessment"*; and
- a CIOB indicative range of *"the national legal system including .. environment."*

Environmental law is therefore mandated by both construction and engineering professional bodies.

Paper 4*"Regeneration of Brownfield Land: the Environmental Law Challenges"* investigated environmental law issues surrounding the regeneration and re-use of brownfield land including contaminated land, waste management, water pollution, regulators, environmental impact assessment issues were investigated.

## 6.5 Interpreting contractors' mandated standard of design

Paper 1 identified the following relevant learning outcome and core competency:

- *"the market including customer, supplier and competitor relationships and issues including types of contracts that may be entered into"* learning outcome as specifically required for IET accredited bachelor degree programmes ;

- For the RICS quantity surveying and construction pathway the core competencies include *"contract practice – provide evidence of reasoned advice, prepare and present reports on the selection of appropriate form of contract"*; and

- a CIOB indicative range of *"breach of contract damages"*

Similarly, forms of contract are mandated by both construction and engineering professional bodies.

Paper 5 *"Interpreting contractors' mandated standard of design"* covers contractors' standard of design responsibility by analysing current standard forms of contract and reviewing recent relevant case law.

## 6.6 Construction and Engineering Law Compared and Contrasted

The overlap, in academia, between construction and engineering law of legal topics including legal framework, contract, environmental and health and safety law has been identified. They differ in that engineering bodies additionally require intellectual property awareness and

construction institutions include dispute resolution and land law. The author also argued that the importance of European law should be recognised.

Although framed in a construction law context, the research on expert witnesses also applies to engineering expert witnesses who engage in dispute resolution. However, as identified by the accrediting professional bodies in paper 1, there is a greater requirement for dispute resolution in the construction industry.

The RiMaCon research confirmed that the relevant legal risks for construction SMEs in Italy are: procurement, building regulations, construction contract and dispute resolution. The civil engineering SME case study touched on contract terms, regulations and dispute resolution and the additional issue of intellectual property protection was recognised.

Environmental law is relevant to both engineering and construction industries. Similarly, current standard forms of contract and recent case law are pertinent to both industries.

Table 5 compares and contrasts Construction and Engineering Law.

**Table 5**: Construction and Engineering Law Compared and Contrasted

| **Topic** | **Construction Law** | **Engineering Law** |
|---|---|---|
| Legal framework | ✓ | ✓ |
| Contract | ✓ | ✓ |
| Forms of contract | ✓ | ✓ |
| Land law | ✓ | |
| Health and safety law | ✓ | ✓ |
| Environmental law | ✓ | ✓ |
| Building control and planning regulations | ✓ | |
| Intellectual property | | ✓ |
| Dispute resolution | ✓ | |
| Expert witnesses | ✓ | |

## 6.7 Research Limitations

Smith (2015, p.55) advises *"A further key rule is that all the published work submitted must represent a coherent programme of research and make an original contribution to the present state of knowledge in your identified area."* However, the PhD learning outcomes (University of Wolverhampton, 2014) mandate *"substantial critical investigation and evaluation of a topic or set of related topics."*

As a PhD by Publication comprises individual journal papers, their coherence will not be a strong as a traditional PhD thesis. Similarly, the amount of data collected for each paper is smaller than a traditional PhD thesis. The subject area of construction and engineering law is extensive so only specific topics were researched.

Smith (2015, p.65) explains *"If you are undertaking a PhD by published work, co-authored papers can be submitted for your award portfolio but clarity over the proportion of your own contribution to the research and output is important."* Wilson (1996, p.6) confirms *"The citation of multi-authored appears to be allowed by all institutions offering the award."*

Smith (2015, p.66) argues that *"It appears that some examiners would be keen to see the proportion of co-authored texts increased, recognizing that the conceit of the 'sole author' is one of the main flaws of a traditional PhD."* Indeed Fawcett and Pockett (2015, p.17) argue that *"It is uncommon for researchers to work alone."*

All co-authors of the published work are aware and supportive of this thesis. Indeed, their formal endorsed statements are in Appendices 6 and 7.

Wilson (1998, p.15) explains *"The pressures imposed by publishers on the length of papers requires brevity coupled with the ability to recognise the crucial aspects of the research findings and to contextualise them within the current state of knowledge."*

There is limited space within journal papers for a detailed justification of the research methodology so this has been supplemented by an extended research methodology chapter in this commentary.

## 6.8 Application to practice

Chynoweth (2013, p.438) advocates practice-informed research *"where practitioner knowledge and understanding are used to inform both the purpose and the methodology of the research".* He argues (p.439) that this approach should lead to *"enhancing the professional knowledge base and leading to improvements in practice."* All the research undertaken has direct relevance to the practice of construction and engineering law.

Some of the issues for deeper research were developed from practitioner seminars. Indeed, Fullen (2007) advocates that researchers should be encouraged to join and engage in relevant learned societies and professional organizations. Relevant professional events attended include:

- Society of Construction Law seminars
- Adjudication Society sessions
- Construction In-house Lawyers Forum
- Association of Researchers in the Built Environment conferences

The author suggests that these could be considered as communities of practice with specified areas of expertise. Wenger and Snyder (2000, p.142) explain that communities of practice *"develop members' capabilities and build and exchange knowledge".*

## 6.9 Subsequent Developments

The author concurs with one the International Journal of Law in the Built Environment reviewer's comments; "*One of the exciting things about the legal environment is that it never stays still*."

This section discusses developments subsequent to the publication of the journal papers.

### 6.9.1 Expert witnesses

The decision in *Allen Tod Architecture Ltd v Capita Property and Infrastructure Ltd (2016)* suggests that wide disclosure of privileged material is likely to be required where a party seeks permission to change an expert part way through proceedings even where there is little evidence of "expert shopping". This decision highlights the importance of selecting an appropriate expert from the outset of a dispute.

Ennis (2016) concluded that innovations such as experts' presentations and hot-tubbing do not lead to process improvements nor cost savings unless they are carefully managed.

On 24 January 2017, Her Honour Frances Kirkham CBE delivered a presentation titled *"Can we trust the experts?"* to the Society of Construction Law in Birmingham. She highlighted the case of *Van Oord UK Ltd & Anr v Allseas UK Ltd (2015)* where Mr Justice Coulson delivered a 12 point criticism of the claimant's quantum expert and concluded that "*his evidence was entirely worthless*".

Mr Justice Fraser, in *Imperial Chemical Industries Ltd v Merit Merrell Technology Ltd (2017)*, considered that ICI's experts were advocating their client's case, commenting on matters outside their expertise and failing to consider what the outcome might be if MMT's case was correct.

On 7 November 2018, the Third Annual Society of Construction Law West Midlands Debate was *"Are "independent" experts really doing their job?"* The debaters were Anthony Speaight QC, Fiona Sinclair QC, Thomas Crangle and Robert Scrivener of 4 Pump Court. The session was chaired by Sir Rupert Jackson.

### 6.9.2 Risk Management Software System for SMEs in the Construction Industry (RiMaCon)

The RiMaCon research project has been completed. The software prototype won the *'Innovation of the Year'* award at the 2017 West Midlands Celebrating Construction Awards (RiMaCon, 2017).

### 6.9.3 Regeneration of Brownfield Land: the Environmental Law Challenges

Following consultation, the Environment Agency published its updated *"Environment Agency enforcement and sanctions policy"* in May 2018. The policy does not introduce any radical changes but notable ones include new guidance on Enforcement Undertakings; the ability to publish enforcement responses and a new method of calculating Variable Monetary Penalties.

In *Stone and Salhouse Norwich Ltd v Environment Agency (2018)* the landowner failed in its appeal against conviction for knowingly permitting an unauthorised waste operation on its land. The company leased a site to a mattress recycling business which did not have an environmental permit or a waste exemption. Following the service of an enforcement notice from the Environment Agency requiring it to remove the mattresses, the tenant ceased trading and abandoned over 20,000 mattresses. The company proposed a remedial plan which was

rejected by the Environment Agency. The company was subsequently convicted and fined. The case illustrates the risk of landlords' exposure to waste management liabilities of tenants.

## 6.10 Conclusion

The congruence and distinction between the law underpinning construction and engineering in academia and industry has been clarified.

# 7 Conclusions

## 7.1 Contribution to knowledge

*"Substantial critical investigation and evaluation of a topic or set of related topics resulting in an independent and original contribution to knowledge and understanding in the field to which the topic belongs, and which is expressed in a work of publishable quality"*; the first learning outcome for a PhD by Publication (University of Wolverhampton, 2014, p.7) has been achieved as evidenced by the publication of journal papers. The specific contribution to knowledge of each paper is highlighted below.

### 7.1.1 Paper 1 -"Law for engineering undergraduates on accredited courses" (2014)

Paper 1 analysed construction and engineering law required by professional institutions to be taught in academia to undergraduates. The overlap between construction and engineering law of legal topics including legal framework, contract, environmental and health and safety law was identified. They differ in that engineering bodies additionally require intellectual property awareness and construction institutions include dispute resolution and land law.

### 7.1.2 Paper 2 - "Expert Witness Update for 2014" (2015)

Paper 2 reports research on three significant documents relevant to construction expert witnesses which were published in 2014: the Civil Justice Council's (CJC) *"Guidance for the Instruction of Experts in Civil Claims 2014"* in August; the Royal Institution of Chartered Surveyor's (RICS) 4th edition of *"Surveyors Acting as Expert Witnesses"* effective from July and The Society of Construction Law's (SCL) *"Review of Use of Experts in Dispute Resolution"* in June. The following were suggested as barriers affecting experts: regulations, budget controls, availability of evidence and deadlines for reports. Additionally experts felt fees, challenges from experts overseas, a requirement for a more diverse CV and cross examination experience to be the challenges they will face within the next five years.

### 7.1.3 Paper 3 - "Construction industry legal risk identification for SMEs" (2016)

Paper 3 aimed to identify construction-specific legal risks relevant to SMEs in Europe with a view to manage them. The study confirms that the relevant legal risks for construction SMEs in Italy are: procurement, building regulations, construction contract and dispute resolution.

### 7.1.4 Paper 4 - "Regeneration of Brownfield Land: the Environmental Law Challenges" (2018)

Paper 4 investigated environmental law issues surrounding the regeneration of brownfield land including contaminated land, waste management, water pollution, regulators,

environmental impact assessment issues and finally the political agenda together with Brexit implications.

#### 7.1.5 Paper 5 - "Interpreting contractors' mandated standard of design" (2019)

Paper 5 covers contractors' standard of design responsibility by analysing current standard forms of contract and reviewing recent relevant case law.

## 7.2 Achievement of Aim and Objectives

The main aim of the research is to compare and contrast construction and engineering law from an academic to industry perspective. The congruence and distinction between the law underpinning construction and engineering in academia and industry has been clarified. It can therefore be argued that the research aim and objectives have been met.

## 7.3 Recommendations for Future Research

Paper 1 posed the question *"Is there an industry consensus on the scope of engineering and construction law?"* Therefore the continued exploration of the boundaries of construction and engineering law is an option.

Paper 2 proposes an investigation about expert witnesses altering their scope of work to meet the cost constraints imposed by legal teams.

Paper 3 recommends testing whether the finding that the relevant legal risks for construction SMEs in Italy are: procurement, building regulations, construction contract and dispute resolution can be generalised across the European Union.

Paper 4 identifies many topics which merit future research. Most of environmental law applying in England and Wales derives from Europe so the opportunity to revise this area of law has arisen. Environmental and European legislation was criticised in the focus groups but their importance recognised. The proportionality of environmental legislation was debated. New State Aid and compulsory purchase schemes were advocated.

Researchers have argued that Part 2A of the EPA 1990 is unfit for purpose. In the UK, as a priority, the polluter should pay, but where the polluter is not found, it may be possible for residual liability to rest elsewhere on, for example, owners or occupiers of the land or the State. However, an opportunity has arisen to evaluate this choice and perhaps consider a different framework.

There are many initiatives to improve regulation but their impact merits analysis. The role of regulators came under scrutiny in the focus groups. Regulators' traditional policing role was described but their more modern enforcement options recognised. A contentious suggestion was made that the Environment Agency should operate commercially.

The European Union (Notification of Withdrawal) Act 2017[1] received royal assent on 16 March 2017. The UK government initiated the official EU withdrawal process on 29 March 2017 by serving notice under Article 50 of the Treaty on European Union (2007). The

[1] European Union (Notification of Withdrawal) Act 2017, c.9.

European Union (Withdrawal) Act 2018[2], which was to repeal the European Communities Act 1972[3] and make other provision in connection with the withdrawal of the United Kingdom from the EU, was enacted on 26 June 2018.

The European Union (Withdrawal Agreement) Act 2020[4] paved the way for the UK to leave the EU on 31 January 2020 and gave effect to the transition period, which (unless extended) is due to expire on 31 December 2020. However, the UK still needs to negotiate the terms of its future relationship with the EU. As a consequence, a very significant research area of the future impact on construction and engineering law has appeared.

In addition, the introduction of new legislation and its interpretation by the courts will undoubtedly continue to necessitate future research.

# 8 PhD Thesis Submission Reflection (February 2020)

Alvesson and Skoldberg (2009, p. 270) argue that *"The point of reflection is rather to break away from consistency and a narrow focus on a particular aspect, to question weaknesses inherent in the mode of thought one embraces (and is easily imprisoned within)…"*

This chapter presents a reflection by the author on her research journey up to submission of her PhD thesis in February 2020.

## 8.1 Researcher's professional experience

The thesis builds upon three decades of the author's professional experience and is based on previous knowledge in industry.

The author obtained a first degree in Engineering Science from the University of Oxford. She then worked for the BBC as Projects Engineer qualifying as a Chartered Engineer and then as a Fellow of the Institution of Engineering and Technology. She later trained and qualified as a Solicitor, working in private practice and then for a large construction company specialising in construction and engineering law. This was followed by a move to academia, firstly to Loughborough University and then to the University of Wolverhampton.

The author shares the aspiration identified by Fawcett and Pockett (2015, p. 121) *"Most researchers are hopeful that their research findings will have significance and will make an impact as a result of their exploration and investigation of a particular problem or issue of concern."*

## 8.2 The challenges of achieving publication

Boyd (2008, p.207) recognises *"Research is such an elongated journey, riddled with uncertainty, that it puts tremendous stress on individuals".* Fawcet and Pockett (2015, p. 130) acknowledge that *"Writing about research has the added element of exposure to intellectual scrutiny of the work by others. This can be a daunting prospect for new writers."*

[2] The European Union (Withdrawal) Act 2018, c.16
[3] European Communities Act 1972, c.68
[4] European Union (Withdrawal Agreement) Act 2020, c.1

Robins and Kanowski (2008) recognise that the progress of publishing a journal article is time-consuming and drawn-out. They argue that creating the space to finalise publications can be very difficult. Smith (2015, p. 33) recognises that it *"can feel lonely and isolating and you need to be very organised, self-directed and good at time management."*

Furthermore, Kamler (2008, p. 286) acknowledges that doctoral students feel exposed when their writing is published because "*the text is an extension of the scholar and scholarship; it literally puts the self and the work 'out there*.'" One of the interviewee's observed *"Even though the thesis goes to examiners, the thesis itself tends to sit and goes to dust."* (Kamler, 2008, p.290) Another of her interviewees conveyed her fear and anxiety about writing for an unknown audience and seeking international refereed publication. A prominent topic through her interviews, regardless of publication success or failure, was that progress was one of tremendous effort and struggle.

Robins and Kanowski (2008) explain that accomplishing a PhD by published work exposes students to continual review and criticism from outside their domain. Smith (2015, p.33) acknowledges that researchers "*need to be very resilient to cope with repeated major revisions to submitted papers."* To achieve publication of all journal papers, in total, over twenty peer reviews were considered and actioned. Indeed, the process has been arduous.

Kamler (2008) reports on a doctoral candidate whose co-authored work was rejected three times before acceptance with the supervisor's assured perseverance allowing the researcher to perform like a resilient scholar. Robins and Kanowski (2008) explain that complying with the exact requirements for each journal can be protracted. Furthermore, editorial rejection and resubmission can double the time consumed by this task. Indeed, one paper was rejected but subsequently accepted in another journal.

In summary, as identified by Smith (2015, p. 75) *"Responding to reviewer comments is a balance between satisfying the reviewer and editor, genuinely improving the paper, and being proud of the final output."* and the author endeavoured to follow Smith's (2015, p.72) *"three golden rules: responding completely, responding politely, and responding with evidence"* when addressing the peer reviews.

## 8.3 Journals' peer reviewer

The PhD by Publication route has presented opportunities for example, the author has been invited to peer review articles for the *International Journal of Law in the Built Environment* and the *Construction Law Journal*.

## 8.4 Examining PhDs

The author was the Internal PhD Examiner of a 2016 thesis titled *"The use of arbitration in the construction industry in England and Wales: an evaluation of its continuing role following the Arbitration Act 1996"*.

In addition, further vivas as External Examiner for two theses at the University of Salford are scheduled:

1. The Compatibility of Dispute Resolution Mechanisms with National Culture in the Construction Industry - A Case Study of the Malaysian Statutory Adjudication Regime; and
2. The Influence of National Culture on the Preparation, Evaluation and Negotiation of Time and Money Claims on International Construction Projects.

## 8.5 Editorial Advisory Board of the Institution of Civil Engineers Proceedings: *Management Procurement and Law*

An invitation to join the Editorial Advisory Board of the Institution of Civil Engineers' international journal: *Management Procurement and Law* was accepted in 2018.

## 8.6 Senior Researcher on the European Union funded FP7 Marie Curie Industry – Academia Partnerships and Pathways Project

The appointment as a Senior Researcher on the European Union funded FP7 Marie Curie Industry – Academia Partnerships and Pathways Project: *"Risk Management Software System for SMEs in the Construction Industry (RiMaCon)"* developed my research skills. This led to two research secondments to a construction SME in Italy providing an enlightening experience.

## 8.7 Grants awarded: Environmental and Planning Law Challenges Forums

The author was awarded funding for a Brownfield Research and Innovation (BRIC) – Environmental Law Challenges Forum at the University of Wolverhampton. BRIC members, former and current MSc Construction Law and Dispute Resolution students and ABE academics and PhD researchers were invited to the Forum which was held on 20 June 2017 with over 20 attendees.

The findings of the forum were published in Charlson, J. (2018) Regeneration of Brownfield Land: the Environmental Law Challenges. *Journal of Property, Planning and Environmental Law* (10) pp. 202-218. This research was disseminated via a presentation to the M5 Oldbury Viaduct Scheme project team on 4 March 2019.

A BRIC Planning Challenges Forum was held on 3 October 2018 which attracted 34 attendees. A journal paper reporting the findings has been drafted.

## 8.8 Joint Coordinator of the CIB W113 *"Law and Dispute Resolution Working Commission"*

The author was delighted to have been invited by the newly appointed coordinator of the International Council for Research and Innovation in Building and Construction's (CIB) W113 *"Law and Dispute Resolution Working Commission"* to join him as joint coordinator. The appointment was subsequently confirmed by the CIB in 2017.

## 8.9 CIB International Research Conferences: Scientific Committee Member and Session Chair

Via an invitation to join the Scientific Committee for the CIB International Research Conference: *Shaping Tomorrow's Built Environment* held at the University of Salford in

September 2017, the author's responsibilities included peer reviewing abstracts and then papers.

At the conference, the author presented the paper Charlson, J. and Donovan, J. (2017), "The Environmental Law Challenges to the Regeneration of Brownfield Land". In: Elkadi, H. and Ruddock, L. (Eds.), *Proceedings of CIB 2017 International Research conference*, 11-12 September, Salford, UK; and in addition chaired the CIB W113 *"Law and Dispute Resolution Working Commission"* session.

Subsequently, the author has peer reviewed abstracts and then papers for the CIB World Building Congress 2019: *Constructing Smart Cities* held in Hong Kong in June 2019.

## 8.10 International Conference Co-Chair

The author gained valuable experience as the Co-Chair of the 1st International Conference on Construction Futures held on 19-20 December, 2018 at the University of Wolverhampton. The conference was supported by several CIB Working Commissions.

## 8.11 Nominated as a REF 2021 sub-panel member

The author was nominated by the International Council for Research and Innovation in Building and Construction (CIB) for the REF 2021 sub-panel Unit of Assessment 13 *"Architecture, Built Environment and Planning".*

## 8.12 Textbook Editor Commission

Based on her published work, the author has been commissioned as joint Editor for the next edition of "*Galbraith's Building and Land Management Law for Students*" (Galbraith et al., 2011), The work includes updating the following 5 chapters: The United Kingdom and the European Union; Settlement of Disputes; Special Contracts; Building Contracts and Building Regulation and writing a new Environmental Law chapter.

## 8.13 RICS Research Trust Grant Principal Applicant

The author was the successful Principal Applicant for a RICS Research Trust Grant. The author's Co-Applicants were Dr Andrew Agapiou, University of Strathclyde and Robert Gerrard, NEC Users' Group Secretary. The RICS Research Trust subsequently awarded £9,785 in 2019 for the research project: "*Procurement and contract strategies for offsite manufacturing within UK housebuilding".*

## 8.14 Conclusion

The research journey has culminated in the following achievements:

- Peer reviewing articles for the *International Journal of Law in the Built Environment* and the *Construction Law Journal*.
- Three times being appointed as a PhD Examiner.
- Joining the Editorial Advisory Board of the Institution of Civil Engineers' international journal: *Management Procurement and Law*.

- Appointment as a Senior Researcher on the European Union funded FP7 Marie Curie Industry – Academia Partnerships and Pathways Project: *"Risk Management Software System for SMEs in the Construction Industry (RiMaCon).*
- Brownfield Research and Innovation (BRIC) – Environmental and Planning Law Challenges Forums leading to a paper in the *Journal of Property, Planning and Environmental Law* and another journal paper drafted.
- Appointed as Joint Coordinator of "*W113 - Law and Dispute Resolution Commission*" of the International Council for Research and Innovation in Building and Construction.
- Invited to join the Scientific Committee for the CIB International Research Conference: *Shaping Tomorrow's Built Environment* held at the University of Salford in September 2017.
- Chaired the CIB W113 *"Law and Dispute Resolution Working Commission"* session.
- Co-chair of the 1st International Conference on Construction Futures held on 19-20 December, 2018 at the University of Wolverhampton.
- Nominated by the International Council for Research and Innovation in Building and Construction (CIB) for the REF 2021 sub-panel Unit of Assessment 13 *"Architecture, Built Environment and Planning".*
- Commissioned as Joint Editor for the next edition of "*Galbraith's Building and Land Management Law for Students*" (Galbraith et al., 2011). The work includes updating 5 chapters and writing a new chapter.
- Successful Principal Applicant for the RICS Research Trust of £9,785 for the research project: *"Procurement and contract strategies for offsite manufacturing within UK housebuilding".*

The author has established and developed a credible profile in construction and engineering law research by actively contributing to relevant journals (Robins and Kanowski, 2008).

# 9 Post PhD Thesis Submission Research (June 2021)

This chapter outlines the author's research after submission of her PhD thesis in February 2020 up to her PhD viva in June 2021. A further five journal articles have been published and another two COVID-19 pandemic research papers are in progress. This additional research precipitated a change in the PhD thesis title to *"Emerging Trends in Construction Law at the Confluence of Academia and Industry"*.

The research supports the School of Architecture and the Built Environment's European Regional Development Fund (ERDF) projects: *Construction Futures Research Centre (CFRC)* and *Brownfield Research and Innovation (BRIC).*

Topical and timely research examines the impact of BREXIT and the COVID-19 pandemic on construction law.

## 9.1 Modern Methods of Construction

As the RICS Research Trust funded research project: "*Procurement and contract strategies for offsite manufacturing within UK housebuilding"* was nearing completion, this special issue call for papers was noted:

- *Construction Innovation* Special Issue: Offsite Manufacturing - Industry Transformation and Future Landscape Development

The RICS Research Trust grant funded the part-time appointment of Nenpin Dimka as Research Associate. We therefore together drafted an article with Nenpin focusing on analysing the data and creating the diagrams and the author leading on the other aspects. The article was accepted and published by *Construction Innovation*:

- Charlson, J. and Dimka, N. (2021), "Design, manufacture and construct procurement model for volumetric offsite manufacturing in the UK housing sector", *Construction Innovation* Ahead of print https://doi.org/10.1108/CI-10-2019-0108

The purpose of this study is to gain insight into procurement routes and forms of contract used for volumetric offsite manufacturing (VOSM) in the housing sector of the UK West Midlands. Seminal literature and government reports have established the potential of offsite technologies to improve the supply of quality housing in the UK. However, the lack of a structured procurement route, common to manufacturing approaches in construction, has significantly contributed to delays in large scale adoption.

To achieve the research intention, an exploratory study was undertaken. A literature review of seminal literature and government papers was conducted to establish and benchmark current trends in context. Data was collected using focus groups and interviews with a housing association and housing VOSMs. Grounded theory was used to analyse data and inductively generate themes leading to an original procurement model. The issues identified in the delivery of volumetric housing were categorised into three themes.

The findings suggest a limited familiarity with offsite manufacturing (OSM) by housing providers. Albeit, a willingness to adopt these technologies to deliver housing were demonstrated by trial attempts. However, due to limited knowledge, the approach to procurement is by adapting existing procurement models, which are not ideal and obstruct the potential benefits of using offsite technologies primarily because of the significant difference in processes. Also, geographical location influenced procurement decisions when comparing cost with conventional procurement and the dearth of specific government incentives to deliver housing using offsite technologies. This study proposes a procurement model for VOSM.

The results have implications for decisions about procurement routes and contractual terms used by housing providers delivering volumetric offsite manufactured housing at scale. Although this study focussed on the West Midlands region, most of the issues identified were not geographically unique.

This study contributes to the existing body of knowledge on potential barriers to the adoption of OSM in the housing sector of the UK. The findings will be of value to stakeholders involved in delivering housing and offers a useful contextual basis for future research.

This publication supports the School of Architecture and the Built Environment's European Regional Development Fund (ERDF) project: *Construction Futures Research Centre.*

## 9.2 Regeneration of brownfield land

The researcher's interest in the regeneration of brownfield land led to research about the legal issues. The first publication focused on the environmental law challenges (detailed in 4.4):

- Charlson, J. (2018) Regeneration of Brownfield Land: the Environmental Law Challenges. *Journal of Property, Planning and Environmental Law,* **10** (3) pp 202-218.

The author's second publication, initiated by new planning policy and legislation regarding the regeneration of brownfield land in England, was:

- Charlson J. (2021) "The Introduction of Brownfield Land Registers in England", *Planning Practice & Research* **36(**2) pp 216 – 229.

This review examines recent planning policy and legislation regarding the regeneration of brownfield land in England. The study is centred on housing and England's West Midlands region with a focus on the Black Country.

The Housing and Planning Act 2016 introduced provisions to grant permission in principle for housing-led development in England and mandated the assembly of brownfield planning registers. The Brownfield Land Register Regulations 2017 requirements and their implementation is explored.

The review concludes that of almost 18,000 brownfield sites have been mapped and capacity for 1.3 million homes on 21,000 sites covering 25,000 hectares has been identified on brownfield registers.

These publications support the School of Architecture and the Built Environment's European Regional Development Fund (ERDF) project: *Brownfield Research and Innovation (BRIC).*

## 9.3 Consequences of BREXIT for the UK construction industry

In recognition of the significance of BREXIT to the UK construction industry, two briefings were drafted and accepted by *Proceedings of the Institution of Civil Engineers – Management, Procurement and Law*.

The first briefing was written when the UK had left the EU but was still in the transition period and remained a participant in the EU customs union and single market:

- Charlson, J. (2021) Briefing: Brexit and UK construction law: past, present and future. *Proceedings of the Institution of Civil Engineers – Management, Procurement and Law,* **174**(1) pp 3-6.

The UK left the EU on 31 January 2020, widely referred to as 'Brexit'. However, the country is currently in the transition period and remains a participant in the EU customs union and single market, with the majority of EU law continuing to be applicable. Furthermore, the UK

government's aim is a trade and economic partnership and free trade agreement with the EU. Therefore, knowledge of the EU's development, institutions and sources of law remains relevant to civil engineers.

The EU–UK political declaration incorporates provisions significant to the UK and EU construction industries, including workers' rights, environmental protection, ending the freedom of movement of people between the EU and the UK, integrated supply chains and the intention of the UK to accede to the World Trade Organization government procurement agreement.

This briefing outlines the expansion of the EU and the UK's joining the EU. The EU's institutions, sources of law, former supremacy of European Community law and the Brexit process are explained, along with the terms 'EU customs union and single market' and 'free trade agreement'.

The second briefing was written after the new EU–UK relationship began on 1 January 2021:

- Charlson, J. (2021) Briefing: Beyond Brexit: trade and procurement implications for the UK construction industry *Proceedings of the Institution of Civil Engineers – Management, Procurement and Law,* **174**(3) pp 95-98.

The UK left the EU, commonly referred to as 'Brexit', on 31 January 2020. From 31 December 2020, new EU law does not apply and the European Court of Justice no longer has jurisdiction in the UK. The new EU–UK relationship, which began on 1 January 2021, is explained.

The majority of the provisions of the EU–UK Trade and Cooperation Agreement (TCA) came into force in the UK on 31 December 2020. Significant issues for the construction industry are detailed, including supply chain concerns, the 'level-playing-field' implications, restrictions on the movement of people, limitations on the recognition of professional qualifications and different product standards.

Regarding procurement, the TCA has mandated consideration of environmental, labour and social issues and that UK and EU suppliers must be treated equally in both the UK and EU. The UK is now an independent signatory to the World Trade Organization's Agreement on Government Procurement.

Northern Ireland, as an outcome of the Northern Ireland Protocol, has in effect remained in the EU's single market for goods.

## 9.4 COVID-19 and construction: comparing UK and Australian responses

The COVID-19 pandemic has impacted construction industries world-wide. The author was inspired to seek an Australian collaborator to compare and contrast the UK and Australian responses. Rebecca Dickson, a lawyer and PhD student in the Faculty of Law at Monash University kindly agreed to co-author two papers contributing the Australian perspective.

The first paper "Covid-19 and Construction Law: Comparing the UK and Australian Response" was accepted by the *The International Construction Law Review*:

- Charlson. J. and Dickson, R. (2021) Covid-19 and Construction Law: Comparing the UK and Australian Response. *The International Construction Law Review* **38**(1) pp 5-38.

The paper comparatively analyses the impact of the COVID-19 pandemic on construction law and projects in the UK and Australia. The impact of government responses to COVID-19 on the construction industry have been similarly profound across both jurisdictions albeit by way of different methods.

In the UK, most restrictions have been delivered through health protection legislation, meaning impacts on the construction industry have been indirect and governed by separate guidelines. There is also a nascent body of case law in the UK Technology and Construction Court which reveals the desire of judges to expedite hearings despite the COVID-19 constraints.

In Australia, each state and territory has responded to the pandemic with their own legislative powers creating a complex regulatory framework. There have also been several guidelines issued by key regulatory bodies with uncertain binding nature. Contract issues and challenges in accessing force majeure or the doctrine of frustration are examined.

After the "Covid-19 and Construction Law: Comparing the UK and Australian Response" paper was published, this special issue call for papers was noticed:

- *Construction Management and Economics* Special Issue: What have we learnt from the COVID-19 global pandemic: Improving the construction industry's abilities to foresee, respond to and recover from future endemic catastrophes.

The abstract for Rebecca Dickson and the researcher's second collaboration ""What's it Going to Take? Lessons learned from COVID-19 and Mental Health in the Australian and UK Construction Industries"" has been accepted by *Construction Management and Economics*:

In 2020, the COVID-19 pandemic 'shut down the world' and brought industries to a 'grinding halt'. Although "lockdowns" imposed in Australia and the United Kingdom curtailed significant industry activity, the construction industries in both Australia and the United Kingdom continued to operate with largely administrative modifications. The World Health Organization identified the potential, adverse mental health impact of COVID-19 early.

The state of mental health of those working in the Australian and UK construction industries is a significant, but under-investigated issue. This paper makes a contribution to the gap in existing research by producing scholarly knowledge about how existing regulatory regimes can be used to protect worker mental health and identifying the construction law reforms that can help tackle the high suicide and mental health rates in the Australian and UK construction industries. This paper considers:

1. The mental health of people working in the Australian and UK construction industries, and whether the COVID-19 pandemic increased the need for mental health protection among construction workers.

2. Were the occupational health and safety regulations in place in Australia and the UK at the time of COVID-19 implemented to safeguard the mental health and wellbeing of those who continued working in construction during the pandemic?
3. How did the regulatory regime governing Australian and UK construction industries change in response to the pandemic (especially in relation to individual safety)?
4. Moving forward, what further steps can those charged with safeguarding the safety of construction workers take to protect worker mental health generally and during disruptions such as those experienced in Australia and the UK during COVID-19?

The article uses available data to assess the extent to which existing occupational health and safety regimes protect mental health generally. Law reform research is used to intensively evaluate the adequacy of existing rules and make recommendations for reform. The conclusions reached are that:

1. The existing legislative and regulatory regimes relating to construction worker safety could have been – but were not – used to safeguard the mental health of those working in the construction industry during the COVID-19 lockdowns.
2. It was industry and professional bodies, rather than governments and statutory authorities (such as 'MATES in Construction' in Australia and 'Mates in Mind' in the UK), which initiated positive interventions to support the mental health of construction workers.
3. It is recommended that the Australian and UK governments take proactive measures to address the high suicide and poor mental health of those working in the construction industries. Such measures should include enforcing existing regulatory regimes with respect to breaches resulting in mental health incidents and increased funding for the development and implementation of initiatives created by professional bodies.

The author noted this call for papers on 'Legal and Contractual Implications of COVID-19 on Construction projects':

- *ASCE Journal of Legal Affairs and Dispute Resolution in Engineering and Construction* Special Collection on 'Legal and Contractual Implications of COVID-19 on Construction projects'

As there was limited COVID-19 case law in Australia, it was decided that a sole-authored paper titled: "Interpreting Contractual Rights to COVID-19 Remedies: An Analysis of UK Cases" would be submitted.

The construction industry has been adversely impacted by the COVID-19 pandemic including significant delays on projects and outbreaks of COVID-19 on site. UK legal cases interpreting contractual rights to COVID-19 remedies are analysed.

The analysis of UK legal cases regarding potential contractual rights to COVID-19 remedies including change in law, force majeure and frustration has revealed the barriers to recovery of losses. Instead, construction companies could consider focussing on more commonly used contract provisions for example, extensions of time and prolongation claims or compensation events.

The UK Supreme Court has ruled on the possibility of payment from business interruption insurance. Even the UK government has failed to comply with public procurement law under pressure of the COVID-19 pandemic. The High Court in London has ruled that landlords are entitled to recover rent and service charges owed to them by tenants whose businesses were mandated to close by coronavirus restrictions.

The Editor's Comments were *"This seems like a great article, absolutely relevant, well written, and well referenced. However, the article is too short for a scholarly paper."*

The author is considering adding more material or maintaining the current length and resubmitting the manuscript as a legal note or forum article.

# 10 Post PhD Viva Reflection (July 2021)

This chapter presents a reflection by the author on her research journey after her June 2021 PhD viva. PhD by publication research is described and then legal research styles examined. The chapter concludes with impact and achievement.

## 10.1 PhD by Publication Research

Research for a traditional PhD is prospective beginning with a research aim. By contrast a PhD by Publication is retrospective. Therefore most of the research will have been completed and published before contemplation of the achievement of a PhD by Publication.

## 10.2 Legal Research Styles

Legal research styles are explained and the researcher's legal stance self-diagnosed.

Chynoweth (2008) explains four legal research styles:

1. Doctrinal legal research which formulates legal 'doctrines' through the analysis of legal rules; often describes colloquially as 'black letter law'.
2. Interdisciplinary research which enquires into law as a social entity and can be described as research about law rather than research in law.
3. Applied legal research is concerned with the systematic presentation and explanation of legal doctrines.
4. Pure legal research can be described as legal theory or jurisprudence and is rarely used as a practical basis for legal analysis.

The author's first journal paper, Charlson, J. (2014) Law for engineering undergraduates on accredited courses. *Proceedings of the Institution of Civil Engineers – Management, Procurement and Law*, **167** (MP4) pp 201–206, addressed legal pedagogy for engineering undergraduates.

Subsequent journal papers adopted a 'black letter law' approach for example, Charlson, J. (2019) Briefing: Interpreting contractors' mandated standard of design. *Proceedings of the Institution of Civil Engineers – Management, Procurement and Law*, **172** (4) pp 142-145.

As the researcher's confidence increased, she aspired to make a difference at the cutting edge through interdisciplinary research about law. Charlson, J. and Dimka, N. (2021), "Design,

manufacture and construct procurement model for volumetric offsite manufacturing in the UK housing sector", *Construction Innovation* Ahead of print evidences this research style.

The researcher's established legal stance is interdisciplinary research which can be described as research about law rather than research in law.

## 10.3 Impact and Achievement

The author has fifteen journal articles published and jointly edited this book:

- de Silva, C. and Charlson, J. (eds.) (2021) *Galbraith's Construction and Land Management Law for Students*. 7th ed. Abingdon: Routledge

She was also the author of the following chapters:

- Chapter 2 - The United Kingdom and the European Union
- Chapter 3 - Dispute resolution
- Chapter 7 - Special contracts
- Chapter 8 - Construction contracts
- Chapter 16 - Building Regulations
- Chapter 17 - Environmental law

In addition, her research has achieved impact beyond journal papers as evidenced by these invited blogs, webinar and talk:

- Generated interest with the *"Post-Brexit: the Future UK-EU Construction Industry Relationship"* invited blog post for the Brexit Institute (August 2020)
- CIB W113 Law and Dispute Resolution Webinar *"Covid-19 Construction Challenges through a legal lens: UK and Australian perspectives"* (21 October 2020) persuaded 165 participants to register
- Brownfield Research and Innovation Centre (BRIC) Talk *"Brownfield Land Registers"* (15 April 2021) attracted 41 attendees
- In recognition of *International Women's Day* the author was invited to write a blog featuring Athena Swan for Emerald Publishing (8 March 2021)

As her research developed, the researcher's publications became more proactive by responding to journal calls for special issues and timely and topical concerns for example, Brexit and the COVID-19 pandemic. A focus of the author's research has been on housing through the regeneration of brownfield land and modern methods of construction.

The author continues her strategic opportunism to proactively progress her research by seeking grant opportunities and journal calls for special issues papers.

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## Appendix 6 (Paper 2 Co-author Statement)

## Appendix 7 (Paper 3 Co-author Statement)